https://doi.org/10.51885/3134-8041_JACS_2026_2_12
SRSTI 67.25.19

CONTINUITY OF MILYUTIN'S PRINCIPLES IN MODERN URBAN PLANNING STANDARDS OF KAZAKHSTAN: ANALYSIS, ISSUES, AND REFORM PERSPECTIVES

ҚАЗАҚСТАННЫҢ ЗАМАНАУИ ҚАЛА ҚҰРЫЛЫСЫ НОРМАЛАРЫНДАҒЫ МИЛЮТИН ҚАҒИДАТТАРЫНЫҢ САБАҚТАСТЫҒЫ: ТАЛДАУ, МӘСЕЛЕЛЕР ЖӘНЕ РЕФОРМАЛАУ ПЕРСПЕКТИВАЛАРЫ

ПРЕЕМСТВЕННОСТЬ ПРИНЦИПОВ МИЛЮТИНА В СОВРЕМЕННЫХ ГРАДОСТРОИТЕЛЬНЫХ НОРМАХ КАЗАХСТАНА: АНАЛИЗ, ПРОБЛЕМАТИКА И ПЕРСПЕКТИВЫ РЕФОРМ

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Keywords:

Urbanism, hybrid urban models, sustainable development, retrospective adaptation, and technological expansion.

ABSTRACT

This article investigates the phenomenon of the persistence of N.A. Milyutin's urban planning principles, formulated in the "Sotsgorod" concept, within the modern regulatory framework of Kazakhstan. The relevance of the work is due to the critical contradiction between Astana's need for sustainable development and the preservation of outdated Soviet-era regulations. Based on a detailed comparative analysis of Soviet (SNiP 2.07.01-89) and current (SNiP RK 3.01-01As-2021) standards, the authors prove that the fundamental city structure the microdistrict, rigid functional zoning, and fixed service radii remains unchanged. It is established that modern adjustments are limited to tightening quantitative indicators, ignoring the qualitative transformation of the environment. This preserves problems of commuting, fragmentation of green spaces, and high car dependency. The conclusion justifies the need for a fundamental reform of the planning system: a transition from directive rationing to flexible parametric models that encourage mixed-use development and social diversity.

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Түйінді сөздер:
урбанизм, гибридті қалалық модельдер, тұрақты даму, ретроспективті бейімделу, технологиялық экспансия.

ТҮЙІНДЕМЕ

Бұл мақалада «Соцгород» тұжырымдамасында тұжырымдалған Н.А. Милютиннің қала құрылысы қағидаттарының Қазақстанның қазіргі заманғы нормативтік базасында сақталу феномені зерттеледі. Жұмыстың өзектілігі Астананың тұрақты даму қажеттілігі мен кеңестік дәуірдегі ескірген регламенттердің сақталуы арасындағы сыни қайшылыққа байланысты. Кеңестік (СНиП 2.07.01-89) және қолданыстағы ҚР ҚН 3.01-01Ас-2021) нормаларға егжей-тегжейлі салыстырмалы талдау негізінде авторлар қаланың іргелі құрылымы – шағын аудан,қатаң функционалдық аймақтарға бөлу және қызмет көрсетудің бекітілген радиустары өзгеріссіз қалғанын дәлелдеді. Қазіргі заманғы түзетулер ортаның сапалы трансформациясын елемей, тек сандық көрсеткіштерді қатаңдатуға әкелетіні анықталды. Бұл маятниктік көші-қон, көгалдандырудың үзінділігі және жоғары көлікке тәуелділік мәселелерін сақтайды. Қорытындыда жоспарлау жүйесін түбегейлі реформалау қажеттілігі негізделген: директивті нормалаудан аумақтарды аралас пайдалануды және әлеуметтік әралуандылықты ынталандыратын икемді параметрлік модельдерге көшу.

Ключевые слова:
урбанизм, гибридные городские модели, устойчивое развитие, ретроспективная адаптация, технологическая экспансия.

АННОТАЦИЯ

В данной статье исследуется феномен устойчивости градостроительных принципов Н.А. Милютина, сформулированных в концепции «Соцгорода», внутри современной нормативной базы Казахстана. Актуальность работы обусловлена критическим противоречием между потребностью Астаны в устойчивом развитии и сохранением устаревших регламентов советской эпохи. На основе детального сравнительного анализа советских (СНиП 2.07.01-89) и действующих (СНиП РК 3.01-01Ас-2021) норм авторами доказано, что фундаментальная структура города – микрорайон, жесткое функциональное зонирование и фиксированные радиусы обслуживания – осталась неизменной. Установлено, что современные корректировки сводятся лишь к ужесточению количественных показателей, игнорируя качественную трансформацию среды. Это консервирует проблемы маятниковой миграции, фрагментарности озеленения и высокой автомобилезависимости. В заключении обоснована необходимость фундаментальной реформы системы планирования: переход от директивного нормирования к гибким параметрическим моделям, поощряющим смешанное использование территорий и социальное разнообразие.

INTRODUCTION

The modern era is characterized by rapid changes in the urban environment: globalization, climate challenges, digital innovations, and social polarization are shaping new planning requirements (Gentile, 2018). Cities are becoming epicenters of economic and cultural processes, and sustainable development depends on the quality of their planning (Tuvikene et al., 2019). However, many post-Soviet cities, including the capital of Kazakhstan, Astana, are characterized by a surprising stability of regulatory approaches. Despite ambitious projects and modern architecture, the regulatory and legal framework is based on principles formulated in the mid-20th century (Nurlanova, 2022). This discrepancy creates a critical barrier to sustainable urban

development in post-Soviet nations, making the revision of these standards an urgent priority. This phenomenon requires serious reflection, as it reveals the mechanisms of historical continuity and its impact on modern practice (Stanilov, 2007).

The fundamental approaches of Soviet urban planning were laid down in the concept of the "Sotsgorod" (Socialist City), developed by architect and theorist N. A. Milyutin in the 1920s. He described the city as a single organism with a rigid functional structure: work, residential, and recreational zones are separated; infrastructure is subordinate to production processes; social services are evenly distributed; and green belts serve sanitary and recreational functions (Miliutin, 1974). These ideas had a profound influence on planning standards and were subsequently enshrined in Soviet building norms and rules (SN 41-58, SNiP 2.07.01-89). Subsequently, after the collapse of the USSR, the updated SNiPs of Kazakhstan inherited many of these provisions, leading to the preservation of a planning paradigm that emerged almost a century ago (Meuser & Zadorin, 2016; Zarecor, 2018).

The relevance of the study is due to the fact that planning approaches based on rigid regulations do not always meet the needs of modern cities. Changing social practices, new requirements for environmental sustainability, and the diversity of urban space pose tasks for the regulatory system that go beyond functional separation (Neugebauer & Rekhviashvili, 2015). In particular, the concept of the "15-minute city" (Moreno et al., 2021), Transit-Oriented Development (TOD), and green and blue infrastructure require a rethinking of regulatory guidelines, which, if based on Milyutin's principles, may hinder innovation.

While existing literature acknowledges the Soviet legacy in Central Asian urbanism, there is a lack of systematic comparative analysis linking specific planning principles of the 1930s 'Sotsgorod' directly to the quantitative indicators of the 2021 Building Codes of Kazakhstan.

This article aims to fill this gap by conducting a systematic comparative analysis of these regulatory documents. To achieve this, the study addresses the following research questions:

(1) Which specific spatial and functional principles of N.A. Milyutin’s 'Sotsgorod' have been retained in the modern SNiPs of Kazakhstan?

(2) How do these preserved regulatory parameters affect the current urban morphology and sustainability of Astana?

(3) What specific regulatory changes are required to align Kazakhstan's planning standards with modern international practices?

The scientific novelty of this research lies in demonstrating the quantitative continuity of the 1930s standards in 21st-century regulations and developing evidence-based recommendations for the transition from normative regulation to parametric planning.

LITERATURE REVIEW

N.A. Milyutin's book Sotsgorod, published in 1930, was an attempt to rethink the bourgeois city from the perspective of socialist ideology. Milyutin saw the city as a tool for educating the new man: a system organized according to the production principle ensures the efficient allocation of labor and daily life (Miliutin, 1974). His concept was based on several key provisions:

1. Functional Zoning and the Linear Principle. Unlike traditional European cities with a historical center, the "Sotsgorod" developed along transport lines. Industrial zones, residential

quarters, agricultural plots, and green belts were arranged in parallel strips. Such a structure implied equal access to different functions and simplified control over labor collectives.

2. The Microdistrict as a Structural Unit. Milyutin proposed organizing housing into blocks (microdistricts), each serviced by schools, kindergartens, shops, and cultural facilities located within walking distance (about 500 m). Microdistricts were to be connected by green avenues and pedestrian routes, while cars and transit transport were diverted to the periphery (Kravchunas, 2019).

3. Sanitary and Recreational Zones. The author emphasized the need for landscaping and creating sanitary gaps between industry and housing. He viewed green belts as an integral part of the urban structure, improving the microclimate and serving as a place for rest.

4. Social Equality. Planning should ensure equality in access to education, culture, and healthcare. To this end, Milyutin proposed distributing services evenly and prohibiting the high concentration of privileged functions in the center.

These ideas were born in the context of rapid industrial transformations and the collectivization of agriculture. Soviet ideology shaped the vision of the city as a space subordinate to the planned economy; therefore, planning decisions had to serve production tasks and the socialization of the population (Zarecor, 2018).

After the publication of Sotsgorod, Milyutin's ideas became the subject of debate. Although many were initially perceived as utopian, in subsequent decades, individual provisions received regulatory consolidation. SN 41-58 "Norms for Planning and Construction of Cities, Settlements, and Rural Populated Areas" introduced the official definition of a microdistrict, establishing that its population should not exceed 10–12 thousand people, and everyday service facilities should be located within 0.5 km of housing. The norms also prescribed a distance between arterial streets of 600–1000 m to ensure walking accessibility to transport stops.

SNiP 2.07.01-89 "Planning and Development of Urban and Rural Settlements" detailed these requirements. It defined a microdistrict as a territory of 10–60 hectares (up to 80 hectares in special cases), not divided by arterial streets, with a service radius of 500 m. The document also introduced requirements for the placement of entrances to microdistricts and intra-quarter driveways: the distance between them should not exceed 300 m, and 180 m during the reconstruction of historical areas. Additionally, the regulations included instructions on driveway widths, the placement of cul-de-sacs, parking standards, and population density, which continued the idea of rational distribution of functions.

Collectively, Soviet norms institutionalized Milyutin's principles: the microdistrict became a mandatory planning unit, distances to facilities became rigid indicators, and green zones became a normative quantity. These provisions were oriented toward creating a hierarchical city structure ensuring the management of transport, infrastructure, and life activity (Alexander, 2007).

After the collapse of the USSR, Kazakhstan formed its own regulatory framework, but it was built on the foundation of the Soviet legacy. SNiP RK 3.01-02-2016, dedicated to landscaping, established rules similar to Soviet ones: building height in parks should not exceed 8 m, built-up area 7% of the park area, distance between entrances no more than 500 m, and visitor parking located outside the park territory at a distance of no more than 400 m. These indicators practically repeat the norms of SN 41-58, supplementing them only with requirements for accessibility for people with limited mobility and aesthetics.

SNiP RK 3.01-01As-2021, the key document for the planning and development of Astana, establishes the microdistrict as a territory of 10–100 hectares. It requires that microdistricts be formed within the red lines of streets, and the share of non-residential objects should not exceed 25%. Walking accessibility to transport stops, shops, schools, and parks has been reduced to 200–400 m, but the logic of radii remains unchanged. The document also establishes a mandatory share of green spaces – 19 m² per resident – and a share of open spaces of at least 40%, which increases requirements for environmental sustainability.

These modern norms demonstrate a combination of quantitative tightening (reduction of distances, increase in green areas) with the preservation of the qualitative structure: the city is still viewed as a set of microdistricts connected by highways; functional zoning remains a basic principle; density and driveway dimensions are regulated in a form created in the mid-20th century.

METHODOLOGY

Selection of Sources. The study is based on the analysis of four regulatory documents: SN 41-58, SNiP 2.07.01-89, SNiP RK 3.01-02-2016, and SNiP RK 3.01-01As-2021. These documents cover a period of over 60 years, allowing for the tracing of the evolution of regulatory requirements. The texts of the regulations were considered in their original edition, taking into account current amendments and additions. Additionally, materials from N. A. Milyutin's book were used to compare theoretical provisions with regulatory ones (Miliutin, 1974). For a deeper analysis, scientific studies dedicated to post-Soviet and contemporary urban development were used: the work of Alexander (2007) on rational planning and its implementation; research by Bissenova (2017) on the socio-cultural aspects of mobility and class; the study by Tleuken et al. (2021) on Astana's building sustainability; the work of Pakina and Batkalova (2017) on green zones in the post-socialist city; the historical analysis of the master plan by Vasiliev (2020); the recent analysis of Astana's infrastructure programs and urban sustainability by Tleuken et al. (2025); and the systematic review of post-Soviet planning paradigms in Central Asia by Junussova et al. (2024).

Comparative Analysis Method. The comparative analysis was structured into four sequential stages to ensure transparency and reproducibility of findings. Stage 1 — Identification of foundational principles. Drawing on Milyutin (1974), eight foundational principles of the «Sotsgorod» concept were extracted, organized into eight comparison parameter groups (Table 1 below): structural unit, functional zoning, service radii, street network, sanitary norms, green provision, development density, and parking standards. Stage 2 – Extraction of normative parameters. Through content analysis of each of the four documents (SN 41-58, SNiP 2.07.01-89, SNiP RK 3.01-02-2016, SNiP RK 3.01-01As-2021), specific clauses, tables, and numerical values corresponding to the eight parameter groups were systematically retrieved. Stage 3 – Classification of change type. For each parameter, one of three categories was recorded: (a) full continuity – the formulation and numerical value remain identical or differ within ±10%; (b) quantitative adjustment – the underlying concept is preserved, but the numerical value differs by more than 10%; (c) qualitative transformation — the very logic of regulation has changed (e.g., a shift from population density to floor area ratio). Stage 4 – Interpretation. The results were juxtaposed with empirical research on post-Soviet urban morphology (Alexander, 2007; Bissenova, 2017; Tleuken et al., 2021) and with contemporary international planning paradigms

– the 15-minute city (Pozoukidou & Chatziyiannaki, 2024; Khavarian-Garmsir et al., 2024), Barcelona's superblocks (Frago, 2024; Amati et al., 2024), and Transit-Oriented Development (Dominguez-Gonzalez et al., 2024) – to assess the actual influence of inherited norms on the spatial morphology of Astana.

The classification thresholds (±10% for continuity vs. quantitative adjustment) were chosen to exclude minor editorial variations and capture only those changes reflecting deliberate revision of standards. Additionally, the interpretation of norms in the literature was analyzed: what actual effects these requirements have, how they are perceived by the professional community and the population (Fauve, 2015; Koch, 2010), and how they compare with recent reform debates in post-Soviet contexts (Junussova et al., 2024) and global discussions of building code reform (Zhang, 2022). The analytical framework also draws on critical perspectives on the 15-minute city concerning physical determinism and the limits of one-size-fits-all approaches (Khavarian-Garmsir et al., 2024).

Study Limitations. It is important to note that the results of the study are based on textual analysis of documents and do not account for the practical implementation of norms. Implementation may vary depending on economic capabilities, political decisions, cultural traditions, and social dynamics, as well as the institutional capacity of municipal governance (Zhumabekova & Mukanov, 2025). Furthermore, the focus on Astana does not cover the entire geography of Kazakhstan, although basic principles are applied in other cities as well, including Almaty and Qonayev (Aktymbayeva et al., 2025). Nevertheless, the conclusions have general significance for all post-Soviet cities experiencing the influence of the Soviet legacy (Stanilov, 2007), particularly in the Central Asian context where similar regulatory inheritance is observed (Junussova et al., 2024).

Table 1. Operational framework for the comparative analysis of regulatory documents

№	Parameter group	Specific indicators compared	Units of measurement
1	Structural unit of planning	Microdistrict area, population density	ha; persons/ha
2	Functional zoning	Share of non-residential objects, types of permitted use	%; categorical list
3	Service radii	Walking distance to public transit, schools, kindergartens, shops	m
4	Street network	Cul-de-sac length, carriageway width, distance between entries	m
5	Sanitary norms	Sanitary gaps between buildings, insolation, distance to waste container sites	m; hours
6	Green provision	Greenery per capita, share of open spaces	m²/capita; %
7	Development density	Floor area ratio (FAR), number of storeys, plot coverage	dimensionless; storeys; %
8	Parking standards	Distance to parking, share of garaged storage, parking spaces per dwelling	m; %

Note – developed by the authors based on Milyutin (1974) and the four regulatory documents under analysis

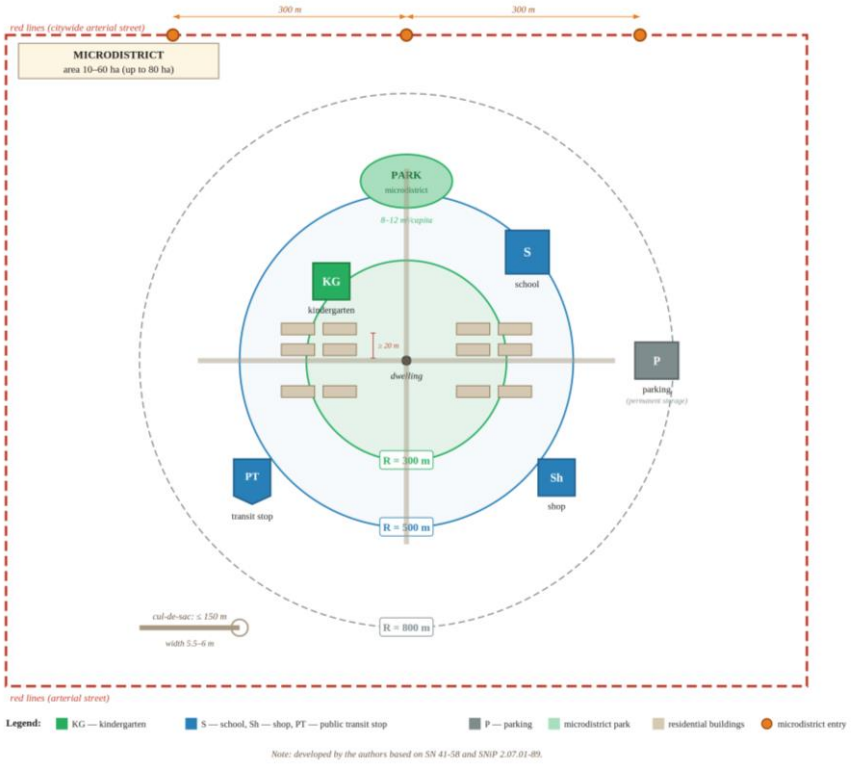

Figure 1. Normative microdistrict model under SNiP 2.07.01-89

Note – developed by the authors based on SN 41-58 and SNiP 2.07.01-89

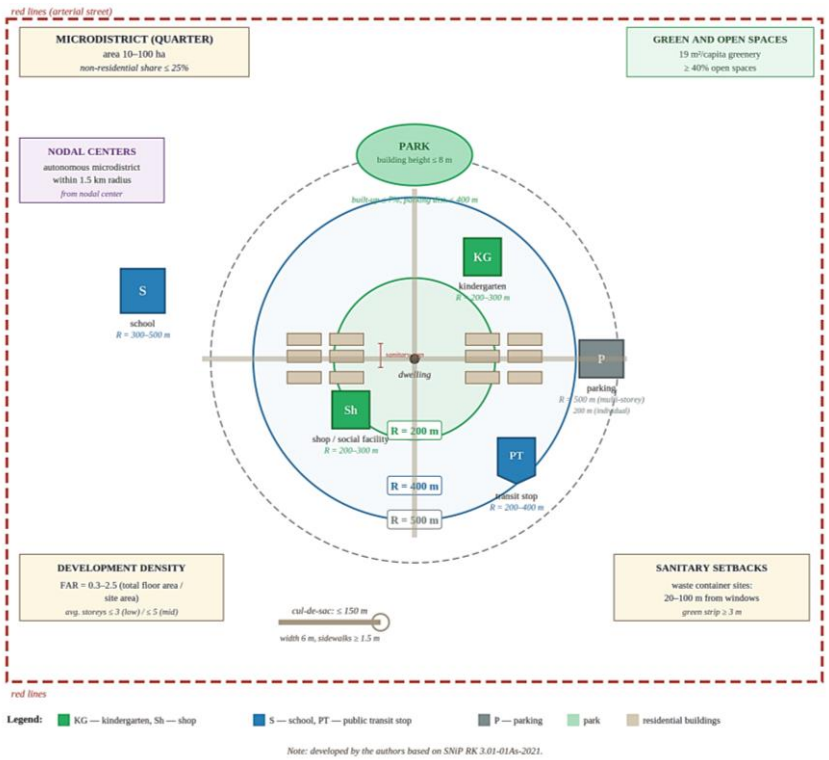

Figure 2. Normative microdistrict model under SNiP RK 3.01-01As-2021 for the city of Astana

Note – developed by the authors based on SNiP RK 3.01-01As-2021

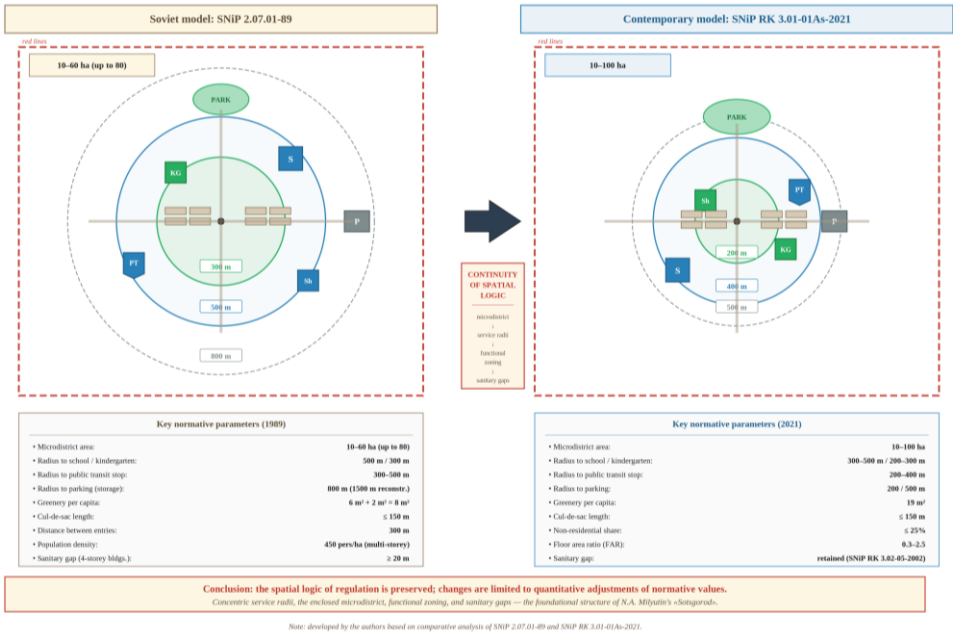

Figure 3. Comparison of normative models: continuity of spatial logic between SNiP 2.07.01-89 (1989) and SNiP RK 3.01-01As-2021 (2021)

Note – developed by the authors based on comparative analysis of SNiP 2.07.01-89 and SNiP RK 3.01-01As-2021

RESULTS

Analysis of the regulations shows that the concept of the microdistrict remains the unchanging core of the planning structure. Initially, according to SN 41-58, a microdistrict was defined as a territory between arterial streets, free from public driveways. It provided for medium-rise residential buildings, a regular grid of intra-quarter driveways, and the mandatory placement of schools, childcare institutions, shops, and medical points. The service radius was 0.5 km — this value is repeatedly repeated in the regulations. The document also indicated that the microdistrict should have its own microdistrict park and sports grounds, and its boundaries are fixed by red lines and natural or planning constraints.

In SNiP 2.07.01-89, the microdistrict was consolidated as a structural element with an area of 10–60 hectares (up to 80 hectares under special conditions) with the same service logic. At the same time, the norm was supplemented by the concept of a "quarter," which allowed for the allocation of smaller units within the microdistrict. The text of the document emphasized that the microdistrict should not be intersected by arterial streets; its internal streets should ensure access to every house, and main entrances should be located at intervals of 300 m. Such an approach allowed for the preservation of a uniform structure and manageability (Kravchunas, 2019).

The modern SNiP RK 3.01-01As-2021 preserves the concept of the microdistrict, expanding the area range to 10–100 hectares. An important difference lies in the limit on the share of non-residential objects (25%) and the possibility of forming autonomous microdistricts within a radius of 1.5 km from nodal centers. However, there are no radical changes: as in Soviet regulations, the microdistrict remains the basic "brick" of the city. This indicates the deep rootedness of Milyutin's approach and the difficulty of moving away from it.

Soviet regulations paid special attention to the distance to public transport stops. SN 41-58 provided that the distance between thoroughfares with mass transport should be 600–1000 m so that residents could walk to a stop in 5–7 minutes. The provision took into account that for most

citizens, the main mode of travel was the tram or bus. The document also indicated that stopping points should be located near shops, pharmacies, clinics, and other important institutions, emphasizing an integrated approach to planning.

SNiP 2.07.01-89 detailed the requirements: maximum pedestrian accessibility to a stop - 500 m; in northern climatic zones - 300 m, in southern - 400 m; for central urban areas - 250 m. The document officially established intervals between stops for various types of transport (e.g., 400–600 m for buses) for the first time, allowing for more precise route planning. Additional norms concerned the distance from residential buildings to parking lots: no more than 800 m (1500 m in reconstructed areas) for permanent vehicle storage.

SNiP RK 3.01-01As-2021 significantly reduces distances: to public transport stops — 200–400 m; to shops and social facilities - 200–300 m; to parking lots - 200 m for individual development and 500 m for multi-story areas. These values reflect a modern understanding of comfort and improved quality of life. However, the system of radii itself, set as a mandatory rule, is preserved. This demonstrates that Milyutin's approach - the standardization of distances - remains the basis of planning logic.

The street network plays a key role in ensuring transport accessibility and organizing the internal space of the microdistrict. SN 41-58 prescribed that the length of cul-de-sacs (dead-end driveways) should not exceed 100 m, and the width - 8–10 m; at the end of the cul-de-sac, it is necessary to arrange a circular turning device with a radius of 10 m or a rectangular platform 12×12 m. This allowed fire equipment and maintenance services to turn around and also prevented excessive lengthening of driveways, which worsened access.

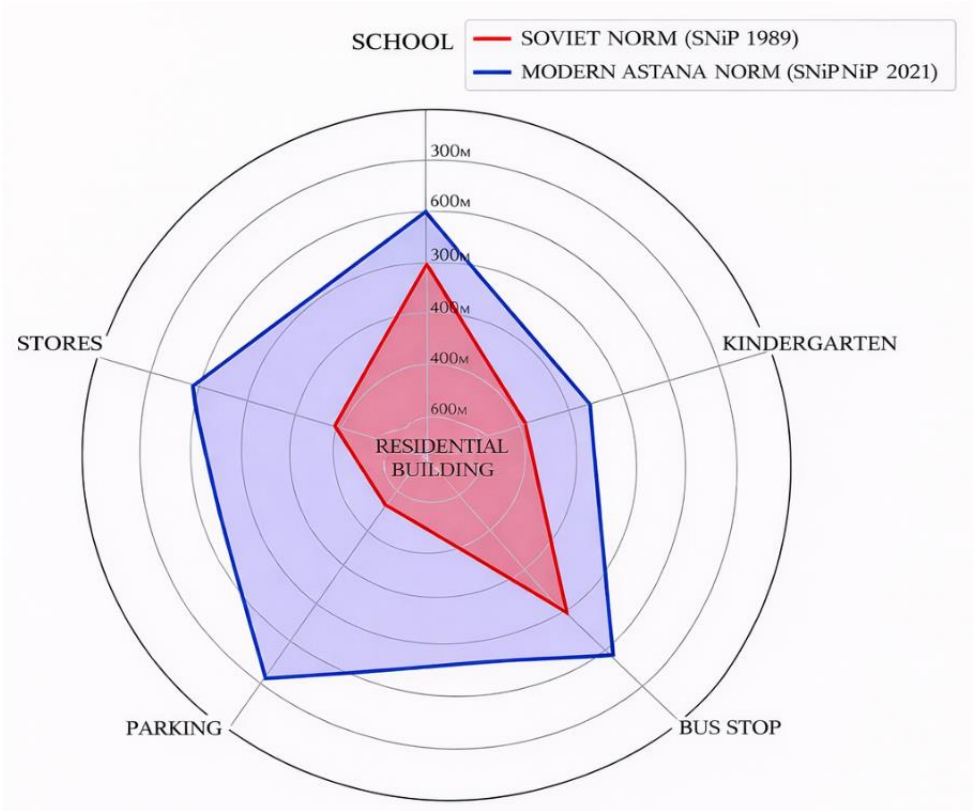

Figure 4. Morphological Comparison of Soviet Microdistrict Horizontal Space and Modern Astana Quarter Vertical Densification

Note – compiled by the authors based on SNiP 2.07.01-89 and SNiP RK 3.01-01As-2021 data.

SNiP 2.07.01-89 increased the maximum length of a cul-de-sac to 150 m and specified that in 5–9 story buildings, driveways with a width of 5.5 m are allowed with periodic widening to 6 m at a distance of 75 m for passing traffic. For single-row development, a carriageway width of 3.5 m was permitted. The document also prescribed locating entrances to the microdistrict at a distance of 300 m and ensuring exits to streets at no fewer than two points.

In the modern SNiP RK 3.01-01As-2021, these requirements are preserved: cul-de-sacs — no more than 150 m; carriageway width along facades — 6 m; sidewalks — at least 1.5 m; at the end of the cul-de-sac — a turning area for fire equipment. Thus, the standard continues the tradition of regulating the street network through rigid numerical restrictions.

SANITARY GAPS AND INSOLATION

One of the important aspects of Milyutin's model was concern for insolation and sanitary gaps between buildings. SN 41-58 indicated that the distance between the long facades of buildings should be at least the height of two buildings, and during reconstruction — at least one height, but in any case, not less than 12 m. The norms also fixed minimum distances from windows to outbuildings and plot boundaries. This ensured natural lighting and ventilation, as well as prevented the accumulation of pollution (Tleuken et al., 2021).

SNiP 2.07.01-89 in clause 2.12 preserved these requirements, establishing that distances between facades of 2–3 story residential buildings at least 15 m, and 4-story — at least 20 m; reduction is allowed while maintaining normative insolation. In addition, the document regulated the placement of waste container sites: at least 20 m from buildings of children's and educational institutions, no more than 100 m from entrances to residential buildings.

Modern norms of Kazakhstan refer to a separate document on insolation and lighting (SNiP RK 3.02-05-2002) and sanitary rules, but essentially preserve similar gaps. SNiP RK 3.01-01As-2021 establishes that container sites should be placed at a distance of 20–100 m from the windows of residential buildings and fenced with a green strip; the volume of the site should be 0.03 m² per person. The document also requires that green strips of at least 3 m separate utility areas from recreation zones. Thus, the foundations of sanitary gaps and insolation formulated by Milyutin continue to determine the requirements for the urban environment.

Green belts and parks occupied a special place in the "Sotsgorod". Milyutin viewed them as an element of population health improvement and part of the production process (workers rest after a shift in specially organized gardens). SN 41-58 consolidated the mandatory presence of green spaces in microdistricts: micro-yards, public gardens, and parks were to provide 8–12 m² of greenery per resident. In addition, the document required that parks and squares be located evenly throughout the city and connected by green corridors.

SNiP 2.07.01-89 reinforced this norm: green zones of common use must constitute at least 6 m² per person, and intra-quarter plantings — another 2 m². The document classified green spaces into city, district, and microdistrict ones, defining the area of each and the radius of availability. For example, for a microdistrict garden — no more than 500 m, for a district park — 1 km. This preserved Milyutin's idea but refined the functional distribution.

The modern SNiP RK 3.01-01As-2021 introduces even higher standards: the total area of open spaces must be at least 40% of the territory; provision of green spaces — 19 m²/person; separate indicators are provided for park, district, and local green zones. Additionally, park infrastructure is regulated: building height no more than 8 m, built-up area — 7%, number of parking spaces — 7–10 per 100 visitors, distance to parking — no more than 400 m. These requirements reflect a desire to increase environmental sustainability but are based on the same regulatory paradigm — precise numerical norms (Pakina & Batkalova, 2017).

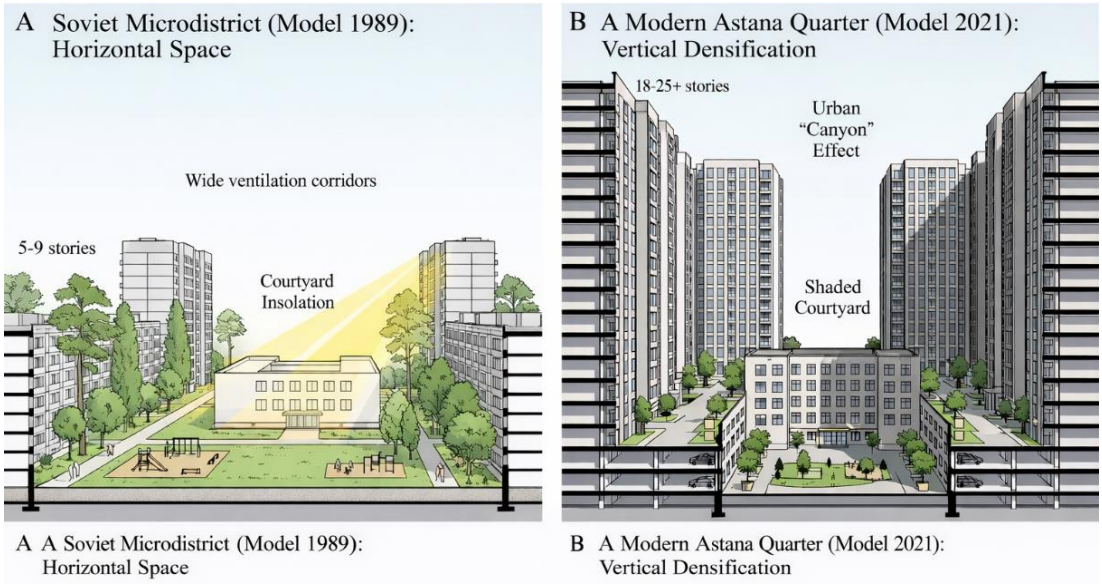

Figure 5. Comparative Spatial Analysis Soviet Microdistrict Model 1989 and Modern Astana Quarter Model 2021

Note – developed by the authors

Residential building density in Soviet norms was a tool for ensuring sanitation and safety. In SN 41-58, Table 32 established the maximum percentage of plot development and the minimum living space per hectare, depending on the number of stories. For example, for 2-story development, the percentage of development should not exceed 28%, and the minimum provision of living space — 2000 m²/ha; for 5-story — 24% and 4400 m²/ha; for 8-story — 20% and 5500 m²/ha. These indicators limited height and encouraged moderate density, providing spaces for green spaces and intra-quarter roads.

SNiP 2.07.01-89 shifted to regulating population numbers: a density of 450 people/ha for multi-story areas. At the same time, the norms preserved requirements for the area of green zones, recreation and sports grounds, and also took into account insolation and aerodynamics.

SNiP RK 3.01-01As-2021 regulates density through the building intensity coefficient: the ratio of the total area of the building to the plot area must be in the range of 0.3–2.5, depending on height. Additionally, the document establishes the average number of stories (volumetric-spatial index), which should not exceed 3 for low-rise development and 5 for medium-rise. Despite the transition to new metrics, the ideology remains the same: the standard dictates permissible density and height based on sanitary, climatic, and transport considerations. This continues Milyutin's tendency to regulate the city by setting clear quantitative limits.

Soviet norms paid attention to the placement of vehicles. SN 41-58 prescribed that parking areas should be located near institutions and shopping centers, and the distance from the parking lot to entrances should not exceed 200–300 m. The document also noted the need to isolate parking lots from residential buildings and playgrounds with green strips.

SNiP 2.07.01-89 introduced more detailed requirements for vehicle storage: at least 90% of the fleet must be located in garages and open parking lots within a radius of 800 m from homes (1500 m in reconstructed areas), and temporary parking lots must provide for at least 70% of cars with distribution by city zones. The norms determined the share of garages and open parking lots, taking into account the size of the city and population density.

The modern SNiP RK 3.01-01As-2021 reduces distances to parking: permanent storage — 200 m for individual development and 500 m for multi-story areas; guest parking lots must be

located 400 m from park entrances, with 7–10 cars parking per 100 visitors. These norms reflect the growth of motorization among the population and the desire to keep cars near the home, which simultaneously contradicts concepts of reducing the use of private cars.

Soviet regulatory documents detailed the parameters of service facilities: schools, kindergartens, shops, clinics, and houses of culture. For example, SN 41-58 and SNiP 2.07.01-89 contained tables defining the necessary areas and capacity of institutions, as well as their service radii. Schools, as a rule, were located at a distance of no more than 500 m; kindergartens — 300 m; shops — 400 m. For sanitary and household enterprises, sanitary gaps and landscaping requirements were indicated. Modern norms of the RK reproduce these indicators, sometimes shortening distances (to 200–300 m) but preserving the model of "basic" and "periodic" services.

It is noteworthy that in modern SNiPs, as in Soviet ones, there are no requirements for the diversity of services, cultural spaces, or community centers; the main emphasis is on functional provision. This reflects Milyutin's interpretation of the city as a production machine where leisure and culture play a secondary role.

Table 2. Comparative Analysis of Urban Planning Parameters Soviet Norms SNiP 2.07.01 89 and Modern Kazakhstan Standards SNiP RK 3.01 01As 2021

Parameter	Soviet Norms (SNiP 2.07.01-89)	Modern Kazakhstan Norms (SNiP RK 3.01-01As-2021)	Trend
1	2	3	4
Microdistrict Area	10–60 ha (up to 80 ha)	10–100 ha	Expansion of scale, retaining the microdistrict structure
Walking Distance to Public Transport	500 m (general); 300–400 m (climate-dependent)	200–400 m	Slight tightening of accessibility requirements
Service Radius (Schools /Kindergartens)	500 m / 300 m	300–500 m	Preservation of rigid service radii
Green Space per Capita	6 m² (residential district) + 2 m² (microdistrict)	19 m² (general citywide target)	Quantitative increase without requirements for spatial connectivity
Parking Distance	800 m (storage garages); 1500 m (reconstruction areas)	200 m (individual parking); 500 m (multi-storey parking)	Significant reduction of distance, strengthening pro-car orientation
Street Network within Microdistricts	No thoroughfares through microdistricts	No thoroughfares; entrances every 300 m	Preservation of the enclosed microdistrict concept
Note – compiled by the authors based on comparative analysis of SNiP 2.07.01-89 and SNiP RK 3.01-01As-2021.			

DISCUSSION

Comparative analysis shows that most of Milyutin's key principles have not only survived but continue to define planning practice in Kazakhstan. The reasons for this phenomenon can be divided into institutional, cultural, and practical.

Institutional factors are related to the procedure for developing norms. Legislative bodies and design institutes often rely on existing documents as a basis for updates. Developing new norms requires significant resources and expertise; using proven standards seems safe and acceptable. In post-Soviet states, institutional memory includes not only documents but also professional personnel: many experts are graduates of Soviet universities accustomed to a certain methodology. This creates a persistent tradition that is difficult to change (Alexander, 2007; Vasiliev, 2020).

Cultural reasons include the perception of the city as an ordered, "rational" space. Soviet ideology taught that a correct city is a city with a clear layout, free from chaotic development. Zoning is perceived as a guarantor of order and sanitary safety. Even ordinary citizens often consider the microdistrict a convenient form because it ensures proximity to schools and shops. Therefore, proposals for mixed and high density are viewed with caution or rejection (Bissenova, 2017).

Practical factors lie in the fact that rigid norms provide clear guidelines for designers. When a standard prescribes the exact width of a street or the number of places in a kindergarten per 1000 residents, it is easier for an architect to draw up a project and get approval. Flexible criteria characteristic of modern international approaches requires more complex calculations, deep context analysis, and public participation. In conditions of limited resources and a desire for rapid construction, "old" norms turn out to be more convenient (Nurlanova, 2022).

The preservation of Milyutin's norms creates a number of environmental and social problems. Firstly, functional zoning promotes the separation of residential, working, and recreational functions, which increases the need for daily commuting. Even with a reduced radius to stops, citizens are forced to travel to visit work, shopping centers, and other facilities, as services are concentrated in separate zones. This increases car dependence and greenhouse gas emissions (Tleuken et al., 2021).

Secondly, landscaping standards are oriented primarily toward quantitative indicators rather than quality. As a result, large but unconnected green areas may appear, which function poorly as an ecological network. Research by Pakina and Batkalova (2017) showed that the green zones of Almaty are fragmented, and their function is limited to recreation; there is no unified system capable of improving biodiversity and ensuring climate adaptation.

Thirdly, density norms and sanitary gaps lead to relatively low building density, especially in areas of individual and low-rise buildings. This hinders the development of public transport and increases infrastructure costs. On the other hand, attempts to maximize land use often run counter to regulatory requirements, which gives rise to illegal infill development or chaotic "inserts."

In international practice, there is a trend toward a transition from rigid planning regulations to flexible approaches based on principles of sustainability and comfort. The "15-minute city" concept implies that all basic functions (work, education, shopping, recreation) should be accessible within a 15-minute walk or bike ride (Moreno et al., 2021). This is not a fixed value but a guideline that adapts to the context. The approach emphasizes the importance of mixed use, diversity of development, street quality, and resident participation in design. In such a model, there are no rigid microdistrict boundaries; the city is viewed as a network of local centers connected to each other.

Transit-Oriented Development (TOD) also offers an alternative: dense development near transport hubs allows for reduced dependence on private cars, increased efficiency of public transport, and the creation of lively, diverse districts. TOD involves a combination of commercial, residential, and public functions in a relatively small area, which contrasts with Milyutin's functional separation.

Examples of reforms from foreign cities demonstrate how it is possible to change regulatory approaches. Paris is actively implementing the 15-minute concept, reducing car traffic zones and encouraging the emergence of micro-districts with rich functions. Barcelona is developing "superblocks" where the carriageway is limited, and the internal space is given to pedestrians. Melbourne and Vancouver are introducing norms for minimum green space area depending on density but allow for flexible regulation of density and use.

The findings of the analysis allow us to suggest several directions for reforming Kazakhstan's urban planning norms to make them more relevant to modern challenges:

Review of Zoning and Incentivizing Mixed-Use Development. It is necessary to abandon the rigid separation of functions and encourage the creation of districts where housing, work, and services coexist. This will reduce the need for daily trips and increase the liveliness of streets.

Flexible Service Radii. Instead of a single distance to objects, ranges should be introduced that take into account density, type of development, and climate. For example, in dense areas, the radius to stops may be smaller, and in low-rise areas — larger.

Qualitative Criteria Instead of Quantitative. Instead of fixed meters and squares, offer descriptive standards: accessibility for all population groups, aesthetic quality of public spaces, street safety, opportunities for social interaction.

Integration of Natural and Cultural Landscapes. Green infrastructure should become a coherent framework of the city: parks, squares, boulevards, embankments, and water bodies should form a network. Norms should prescribe the connectivity of green zones, not just their area (Pakina & Batkalova, 2017).

Flexibility in Density Regulation. A transition is required from rigid percentage norms to indicators that take into account the context: the ability to increase density near transport hubs and reduce it in sensitive zones, with the mandatory provision of green and public spaces.

Involvement of the Public and Experts. Procedures for approving planning decisions should include public hearings, expert discussions, and pilot projects. This will allow adapting norms to the needs of residents and taking into account professional innovations.

Implementation of these recommendations will bring Kazakhstan's urban planning closer to modern international standards and make it more flexible, sustainable, and human-oriented.

Comparative Analysis Based on Examples of Central Asian Cities

Understanding regulatory inertia and ways to overcome it requires considering the experience of other cities in the region. Research on the transformation of urban morphology in Almaty and Tashkent has shown that both cities have large areas of sparsely built-up districts, low medium-rise density, and fragmented green zones (Alexander, 2007; Bissenova, 2017). These features are a legacy of the Soviet planning scheme of microdistricts and sanitary zones; they lead to increased transport demand and the formation of "sleeping" districts. Unlike Astana, where construction is proceeding much faster, Almaty and Tashkent demonstrate how the combination of regulations and natural conditions (relief, climate) forms unique constraints on development. Comparative analysis shows that changes in the regulatory framework must take into account local characteristics: historical development, topography, and climatic context.

Another example is the cities of Fergana and Osh, which have been implementing projects to densify and modernize housing development in recent years. The emphasis is on mixed use

and the development of pedestrian corridors, which goes against previous norms but is supported by local authorities due to economic and social benefits. These practices demonstrate that a gradual transition from Soviet zoning to more flexible formulas is possible with political will and local community initiatives.

THE ROLE OF RECREATIONAL ZONES: KAZAKHSTAN'S EXPERIENCE

In the continental climate of Kazakhstan, recreational zones play a key role in creating a comfortable environment. Astana, as a capital city, possesses unique objects such as the Presidential Park, Nurzhol Boulevard, and the "Astana – Green Belt." Nevertheless, the distribution of green spaces remains uneven: central districts have a more developed park system, while peripheral dormitory microdistricts experience a shortage of recreational areas. Studies indicate that large-scale infrastructure programs often lead to intensive land development, reducing the area of green territories and creating a burden on ecosystems (Tleuken et al., 2021).

The experience of Kazakhstan's national parks (for example, Burabay Park) demonstrates the potential of regional recreation programs that can be integrated into urban infrastructure. Creating green corridors connecting the city with suburban natural zones can improve access to recreation and stimulate ecotourism. The development of a comprehensive program for the development of recreational territories, taking into account both urban norms and regional characteristics, should become a priority for state planning.

Political and Institutional Aspects of Reform

Reconfiguring urban planning norms requires strong political will and coordination between government bodies, business, and civil society. In Kazakhstan, regulatory documents are developed by ministries and approved at the government level, which ensures unity but hinders rapid updates (Fauve, 2015).

Involving local communities and public organizations in the planning process can increase the legitimacy of decisions and ensure they meet the needs of the population. Global experience shows that participatory planning promotes the emergence of innovative solutions and increases project sustainability (Al-Hhagla, 2010). For Kazakhstan, it is important to create feedback and monitoring mechanisms that will allow norms to be adapted as experience is gained and public preferences change.

CONCLUSION

Summarizing the analysis conducted, it can be stated that modern urban planning standards in Kazakhstan largely inherit the principles formulated by N. A. Milyutin. The microdistrict as a structural unit, functional zoning, rigid pedestrian accessibility radii, norms for sanitary gaps and landscaping — all this constitutes the "foundation" of the planning approach. Modern SNiPs only clarify quantitative indicators, introduce additional environmental requirements, and adapt norms to new conditions, but do not change the basic logic.

Such continuity has both pluses and minuses. On the one hand, it ensures continuity of management, predictability for designers, and stability of planning practice. On the other hand, it hinders the introduction of innovations, prevents the formation of mixed and compact districts, and insufficiently takes into account social and environmental aspects of quality of life (Gentile, 2018). In conditions of modern challenges — climatic, economic, social — the city needs flexible, adaptive, and human-oriented norms.

The development of a new regulatory framework requires rethinking historical principles and their functions. It is necessary to view the city as a complex system where space, ecology,

economy, and community are interconnected (Sýkora & Bouzarovski, 2012). Instead of rigid regulations, guidelines should be used that stimulate a creative approach and orient toward quality. Only in this way can Astana and other Kazakhstani cities become laboratories for new urban solutions corresponding to the 21st century.

CONFLICT OF INTEREST: The authors declare no conflict of interest.

FUNDING: This research received no external funding.

INSTITUTIONAL REVIEW BOARD STATEMENT: Not applicable.

INFORMED CONSENT STATEMENT: Not applicable.

DATA AVAILABILITY STATEMENT: The data supporting the findings of this technical study are available from the corresponding author upon reasonable request.

ACKNOWLEDGEMENTS: The authors express their gratitude to colleagues for methodological support and helpful discussions, as well as to anonymous reviewers for valuable comments that helped improve the quality of the article.

STATEMENT ON THE USE OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES: The Authors declare that in preparing this manuscript, a tool of generative artificial intelligence "Grammarly" was used to smooth out the wording, increase the stylistic coherence of the text and check the grammatical correctness of the article. Responsibility for the accuracy, completeness and compliance with the scientific standards of all the material presented lies entirely with the authors.

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