UDC 711.4(510)(091)
IRSTI 05.23.20
RESEARCH ARTICLE

FUNDAMENTAL PRINCIPLES OF TRADITIONAL CHINESE URBAN PLANNING

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Abstract. *Traditional Chinese urban planning constitutes one of the most comprehensive and enduring systems of spatial organization in world architectural history. Rooted in Confucian, Daoist, Buddhist and fengshui principles, it represents a unique synthesis of philosophical doctrines, cosmological models and practical methods of environmental adaptation. This article examines the structural foundations and evolutionary dynamics of traditional Chinese urbanism from the Zhou period to the late imperial era, focusing on the mechanisms that ensured the exceptional continuity of planning principles over more than two millennia. Drawing on classical treatises (Zhou li, Kao gong ji), archaeological evidence, historical reconstructions and contemporary scholarly analyses, the study identifies the key components of the traditional urban model, including axial planning, modular courtyard-based residential units (siheyuan), hierarchical spatial zoning, and the integration of natural elements such as mountains and water systems into the urban structure. Special attention is given to the interplay between ideological norms, cosmological symbolism, and ecological rationality, which shaped the functional and aesthetic logic of Chinese cities. Methodologically, the research employs a combination of historical-cultural analysis, comparative urban morphology and qualitative interpretation of textual and cartographic sources. This integrated approach allows the author to reconstruct the planning logic of major imperial capitals - Chang'an, Luoyang and Beijing - and to interpret them as material manifestations of the political and cosmological order of the empire. The findings demonstrate that the resilience of traditional Chinese urban planning resulted from the interaction of three persistent factors: a stable ideological core, a cosmological framework regulating spatial orientation, and environmentally adaptive resource-management practices. The article concludes that traditional Chinese planning principles retain significant relevance for contemporary urban design, particularly in the fields of sustainable development, landscape-sensitive planning and cultural heritage-based urban regeneration.*

Keywords: *traditional urbanism; Chinese city; cosmology; feng shui; siheyuan; urban structure; imperial capital.*

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https://doi.org/10.51488/1680-080X/2026.3-16

ӘОЖ 711.4(510)(091)
ҒТАМР 05.23.20
ҒЫЛЫМИ МАҚАЛА

ҚЫТАЙДАҒЫ ДӘСТҮРЛІ ҚАЛА ЖОСПАРЛАУЫНЫҢ НЕГІЗГІ ҚАҒИДАТТАРЫ

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Аңдатпа. *Дәстүрлі қытай қала құрылысы әлемдік сәулет тәжірибесіндегі кеңістіктік ұйымдастырудың ең кешенді және тұрақты жүйелерінің бірі болып табылады. Конфуцийшілдік, даосизм, буддизм және фэн-шуй қағидаларының әсерінен ол философиялық ілімдерді, космологиялық модельдерді және табиғи ортамен өзара әрекеттесудің экологиялық бағытталған әдістерін біріктіреді. Бұл мақалада Чжоу әулетінен бастап империяның соңғы кезеңіне дейінгі дәстүрлі қытай қала құрылысы канонының құрылымдық негіздері мен эволюциясы қарастырылады, оның ғасырлар бойы үздіксіздігін қамтамасыз ететін механизмдер анықталады. Зерттеу классикалық трактаттарды (Чжоу ли, Као гун цзи), археологиялық деректерді, тарихи қайта құруларды және қазіргі заманғы ғылыми еңбектерді талдауға негізделген. Қытай жоспарлау моделінің негізгі элементтері атап өтілген: осьтік құрам, тұрғын үй құрылысының модульдік ұйымдастырылуы (сихэюань), қатаң кеңістіктік иерархия және табиғи элементтердің - тау жоталарының, өзендердің және су жүйелерінің - қалалық құрылымға интеграциялануы. Қалалық кеңістіктің функционалдық және эстетикалық логикасын анықтайтын идеологиялық нормалардың, космологиялық символизмнің және ұтымды ресурстарды басқару тәжірибелерінің өзара әрекеттесуіне ерекше назар аударылады. Әдістемелік тәсіл тарихи және мәдени талдауды, салыстырмалы қала морфологиясын және мәтіндік және картографиялық дереккөздерді түсіндіруді қамтиды. Бұл бізге ең ірі астаналардың - Чанъань, Лоян және Бейжіңнің жоспарлау модельдерін қайта құруға және оларды империяның саяси және космологиялық тәртібінің материалдық көрінісі ретінде қарастыруға мүмкіндік береді. Нәтижелер дәстүрлі қала құрылысы принциптерінің тұрақтылығы үш фактордың өзара әрекеттесуімен анықталатынын көрсетеді: тұрақты идеологиялық өзек, қала құрылымының космологиялық бағыты және табиғи ресурстарды пайдаланудың экологиялық орындылығы. Қытайдың дәстүрлі қала құрылысы тұрақты даму, ландшафтқа сезімтал дизайн және тарихи аумақтарды қалпына келтіруді қоса алғанда, қазіргі заманғы қала құрылысы мәселелері үшін өзекті болып қала береді деген қорытындыға келді.*

Түйінді сөздер: *дәстүрлі қала құрылысы; Қытай қаласы; космология; фэн шуй; сихэюань; қала құрылымы; империялық капитал.*

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https://doi.org/10.51488/1680-080X/2026.3-16

УДК 711.4(510)(091)
МРНТИ 05.23.20
НАУЧНАЯ СТАТЬЯ

ОСНОВНЫЕ ПРИНЦИПЫ ТРАДИЦИОННОГО ГРАДОСТРОИТЕЛЬСТВА КИТАЯ

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Аннотация. *Традиционное китайское градостроительство представляет собой одну из наиболее целостных и устойчивых систем пространственной организации в мировой архитектурной практике. Сформированное под влиянием конфуцианства, даосизма, буддизма и принципов фэншуй, оно сочетает философские учения, космологические модели и экологически ориентированные методы взаимодействия с природной средой. В статье исследуются структурные основы и эволюция традиционного китайского градостроительного канона от эпохи Чжоу до позднеимператорского периода, выявляются механизмы, обеспечившие его многовековую преемственность. Исследование опирается на анализ классических трактатов («Чжоу ли», «Као гун цзи»), археологических данных, исторических реконструкций и современных научных работ. Выделены ключевые элементы китайской планировочной модели: осевая композиция, модульная организация жилой застройки (сыхэюань), строгая пространственная иерархия и интеграция природных элементов - горных хребтов, рек и водных систем - в структуру города. Особое внимание уделено взаимодействию идеологических норм, космологической символики и практик рационального управления ресурсами, определивших как функциональную, так и эстетическую логику городского пространства. Методологический подход включает историко-культурный анализ, сравнительную урбанистическую морфологию и интерпретацию текстовых и картографических источников. Это позволяет реконструировать планировочную модель крупнейших столиц - Чанъаня, Лояна и Пекина - и рассматривать их как материальное воплощение политического и космологического порядка империи. Полученные результаты показывают, что устойчивость традиционных градостроительных принципов обусловлена взаимодействием трёх факторов: стабильного идеологического ядра, космологической ориентации городской структуры и экологической целесообразности в использовании природных ресурсов. Делается вывод, что традиционное китайское градостроительство сохраняет актуальность для современных задач урбанистики, включая устойчивое развитие, ландшафтно-чувствительное проектирование и регенерацию исторических территорий.*

Ключевые слова: *традиционное градостроительство; китайский город; космология; фэншуй; сыхэюань; городская структура; императорская столица.*

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https://doi.org/10.51488/1680-080X/2026.3-16

1 INTRODUCTION

Urban planning in China has deep historical roots and is closely tied to the country's philosophical, cultural, and administrative traditions. In the context of globalization and rapid urbanization - where Western planning models increasingly dominate international practice - it becomes especially important to preserve and study traditional approaches, including those shaped by Chinese civilization. Understanding the principles of traditional Chinese urban planning provides insight into how the interplay between tradition and modernity influences the development of contemporary Chinese cities. It is also crucial to note that China's urban planning strategies have historically been intertwined with economic, political, and social transformations, making this topic particularly relevant for researchers in urban studies, architecture, and sociology.

The origins of Chinese urban planning can be traced back to early antiquity, where concepts such as harmony with nature, symbolic spatial order, Confucian norms, and administrative discipline played a defining role. Historically, Chinese cities - such as Beijing and Xi'an - were planned according to cosmological principles that manifested in strict spatial zoning and the central importance of the north-south axis. By the Tang and Song periods, the structural elements of Chinese city planning had become codified and remained highly influential in subsequent centuries [1, 2, 3].

Traditional Chinese urbanism evolved through a synthesis of philosophical doctrines, administrative regulations, and cosmological models articulated in foundational texts such as the Zhou li ("Rites of Zhou") and the Kao gong ji [1, 4]. These treatises conceptualized the city not merely as a site of habitation but as a structured model of the cosmic and social order, mediating the relationship between "Heaven," "Earth," and human society. As Steinhardt (1990, p. 33) notes, the imperial capital functioned as a "ritual diagram of the state," where the spatial arrangement of palaces, ancestral temples, administrative complexes, and city gates formed an integrated political-cosmological system.

At the same time, the remarkable structural consistency observed in many historical Chinese cities suggests an additional dimension of interpretation. The orthogonal street grid, axial composition, hierarchical zoning, and the regulated system of urban wards created a spatial framework that facilitated administrative governance, spatial regulation, and territorial organization. The repeated reproduction of these spatial principles across different historical periods indicates that traditional Chinese urban planning functioned not only as a cosmological model but also as an efficient and reproducible spatial system that contributed to the long-term stability of Chinese cities.

The relevance of this topic is reinforced by the fact that many modern Chinese cities - including Beijing, Xi'an, Nanjing, and Chengdu - preserve structural elements that trace directly back to imperial planning traditions. Scholars emphasize that Beijing's north-south axis, the organization of its historic center, and the system of temple complexes represent enduring manifestations of traditional planning principles [6, 7, 8]. According to Liang Sicheng, the longevity of Chinese urban planning principles is explained by their deep integration into the worldview of society, which ensured their stability even amid political or socio-economic change [1].

A defining feature of Chinese urbanism has always been the intimate relationship between the city and its natural landscape. Attention to wind patterns, topography, rivers, and surrounding mountains was an essential component of the planning process [9, 10, 2, 11] Nature in the Chinese urban space functions not as a backdrop but as an active formative force shaping the orientation of main axes, the placement of palaces, and the configuration of residential districts-an approach that contrasts sharply with many Western planning models.

The purpose of this study is to identify and systematize the fundamental principles of traditional Chinese urban planning and to analyze the structural factors that ensured the long-term stability and reproducibility of this urban model.

The objectives of the study include:

- examining the influence of Chinese philosophical traditions (Confucianism, Daoism, Buddhism) and religious practices on urban planning;
- identifying principles related to harmony with nature, symbolic spatial order, orientation to

https://doi.org/10.51488/1680-080X/2026.3-16

cardinal directions, and landscape factors;

- analyzing planning and spatial organization of traditional Chinese cities, including palaces, temples, public institutions, and residential complexes;
- assessing the interaction between natural landscape and urban structure (rivers, mountains, water systems);
- exploring resource-management methods in traditional urban planning;

comparing normative planning rules from classical treatises with real historical examples of capital cities;

- identifying structural factors that ensured the stability of Chinese urban planning models across millennia.

The structure of the study progresses from theoretical and philosophical foundations to historical context, followed by analysis of spatial models, their symbolic and functional content, and contemporary interpretations of China's traditional urban planning heritage.

The problematics of traditional Chinese urban planning are extensively represented in both international and Chinese historiography. Among the most influential works are studies by Nancy Steinhardt, who interprets imperial capitals as spatial expressions of cosmological and political order [5, 12]; research associated with the Chinese architectural historiographic tradition initiated by Liang Sicheng, which documented the structural and compositional principles of Chinese architectural heritage [1, 13]; and the works of Ronald Knapp, which explore residential typologies and the evolution of traditional settlements in China [14]. Recent studies have further expanded this field by examining the spatial morphology and structural transformation of Chinese cities through modern analytical approaches [15, 16, 17, 18].

Russian scholars - such as Luchkova (2009), Lazarev (2012), Shevchenko (2015), and Ermakov (1986) - also contributed significantly to the study of architectural and symbolic traditions of China, highlighting philosophical foundations, historical preconditions, and the evolution of planning schemes. Their research sheds light on both the ideological bases of Chinese urbanism and the specific characteristics of urban organization across historical periods.

In Chinese academic literature, considerable attention is devoted to the preservation and analysis of urban heritage. Works by Liu, Dunzhen and Fu Xinian provide detailed classifications of traditional architectural forms, reconstructions of city plans, and analyses of palace complexes across different dynasties [1, 13]. Studies by Guo Qinghua and Zhou Xiang highlight the metaphorical and cosmological nature of the Chinese city, interpreting it as an "architectural model of the universe" [2, 8].

Valuable cartographic and analytical materials are provided in the Atlas of Ancient Chinese Cities, prepared by the Chinese Association of Urban Planning (2012). These atlases offer systematic documentation of historical urban layouts - including Chang'an, Luoyang, Beijing, and Kaifeng - and serve as essential reference material for understanding structural features of Chinese urban morphology.

International scholarship on Chinese urbanism is characterized by an interdisciplinary approach. Beyond Steinhardt's contributions, significant insight has been provided by Paul Wheatley, who examined the symbolic structure of the ancient Chinese city and its cosmological underpinnings [3]. Additional perspectives come from studies analyzing Chinese urban systems in relation to social hierarchy and historical evolution [21, 9]. More recent research has increasingly focused on the spatial morphology and structural transformation of Chinese cities, emphasizing the importance of urban form, planning systems, and territorial organization in shaping the historical development of Chinese urban environments [16, 17, 18].

Overall, the degree of scholarly development in this field can be considered substantial. However, most existing studies focus either on architectural aspects or on specific historical periods. A comprehensive analysis that integrates philosophical foundations, spatial planning models, landscape factors, and socio-hierarchical structures remains an important research task. Such an approach makes it possible to better understand the mechanisms that ensured the long-term stability and reproducibility of traditional Chinese urban planning models [1, 20, 12].

https://doi.org/10.51488/1680-080X/2026.3-16

This perspective provides the basis for examining traditional Chinese urban planning not only as a cultural and symbolic phenomenon but also as a spatial system that contributed to the administrative organization and long-term stability of Chinese cities.

2 MATERIALS AND METHODS

The methodological basis of this study includes the historical-cultural method, the comparative method, the analysis of literary sources, and the analysis of statistical and archival data. These approaches are widely employed in architectural and urban studies and are essential for understanding historical contexts, identifying design principles, and evaluating the structure and evolution of urban environments.

The historical-cultural method makes it possible to examine architectural and urban planning objects in relation to their historical development, cultural meaning, and socio-economic conditions. This method provides insight into how architecture and urban planning respond to historical events, ideological systems, stylistic transformations, and cultural traditions.

The comparative method enables the identification of similarities and differences between various objects, phenomena, and processes. In urban and architectural research, it is used to compare planning models, spatial structures, building typologies, and the principles of city organization across different dynasties, regions, or cultural systems.

The analysis of literary sources includes the study of scholarly works, historical chronicles, technical treatises, archaeological reports, and other written materials that document the evolution of Chinese architecture and urban planning. This approach allows for the reconstruction of theoretical models as well as the interpretation of empirical evidence from architectural and archaeological materials.

Together, these methods constitute a comprehensive analytical framework that makes it possible to understand how traditional principles shaped the development of Chinese cities and how historical practices inform contemporary urban research.

For the study of traditional Chinese urban planning, the application of these methods is particularly significant. It enables the combination of philosophical texts, material artefacts, and reconstructions of historical cities. Classical treatises such as Zhou li and Kao gong ji are treated as normative documents defining the structure of the ideal capital [1, 4]. Their comparison with archaeological reconstructions of Chang'an, Luoyang, and early Beijing is based on the comparative method, widely used in the works of Liang Sicheng and Nancy Steinhardt [1, 5].

The comparative method also makes it possible to correlate theoretical models of the "ideal city" with their actual implementation across various historical periods - from Han to Qing - thus revealing the degree of stability and adaptability of urban structures [22, 8]. Research by Chinese scholars shows that the comparison of street grids, cardinal orientations, and ritual-administrative centers provides a basis for reconstructing the evolution of compositional schemes [2, 13].

The analysis of literary sources includes the study of key works in the history of Chinese architecture and urbanism, such as those by Lazarev, Shevchenko, and Ermakov, as well as foundational works by Western and Chinese scholars - Steinhardt, Knapp, Guo Qinghua, and Fu Xinian [6, 7, 4, 12, 14, 2, 13]. These studies form the conceptual basis for identifying structural and semantic patterns within the traditional urban planning canon.

The historical-cultural approach is particularly important for analysing the philosophical and symbolic dimensions of the Chinese city. As noted by Guo Qinghua, the understanding of Chinese architecture is impossible without recognising its metaphorical nature and cosmological foundations [2]. Quantitative data - such as population metrics, density indicators, and spatial characteristics - are also used to compare traditional resource-management strategies with those found in modern urban practice [10, 23].

Collectively, these methods provide a comprehensive basis for studying traditional Chinese urban planning not merely as a historical phenomenon but as a coherent architectural-philosophical system characterised by internal logic, symbolic depth, and long-term structural resilience.

https://doi.org/10.51488/1680-080X/2026.3-16

3 RESULTS AND DISCUSSION

Influence of chinese philosophy and religious traditions on urban planning practices.

Urban planning in China has deep historical roots and was shaped by the major philosophical systems of Chinese civilization - Confucianism, Daoism, Buddhism - and by the spatial harmonization practices of fengshui. These intellectual traditions structured not only the cultural values of society but also directly informed the principles of spatial organization and urban form [6, 7, 2]. These philosophical frameworks also functioned as implicit regulatory systems that structured urban space and supported mechanisms of social and administrative control.

Confucianism attributed great importance to order, hierarchy, and ritual norms. In urban planning, this was expressed through a clear functional division of urban territory and a spatial hierarchy in which the arrangement of districts and buildings corresponded to the structure of society. Such organization not only reflected social hierarchy but also reinforced it by establishing a stable and legible spatial order. The Confucian principle of li (ritual order) determined the placement of the palace, ancestral temples, and administrative centers in accordance with ideals of moral and political harmony [19; 21]. As a result, the central part of the city acquired a sacral-administrative significance, while peripheral areas were designated for residential quarters associated with different social groups. In this context, spatial hierarchy ensured the distribution of functions, the coordination of movement, and the organization of urban life.

Daoism, by contrast, emphasized naturalness, harmony with the environment, and the principle of wu wei - non-intervention and effortless alignment with natural processes. In urban planning, this translated into efforts to integrate the city into the surrounding landscape, avoid excessive alteration of terrain, and create spaces for contemplation and inner harmonization, including gardens, landscaped parks, and temple complexes [6, 2]. At the same time, this approach contributed to environmental adaptation, reducing the need for large-scale transformations and ensuring the sustainability of urban development. A traditional image of a Chinese city is shown in Figure 1.

a) b)

Figure 1 - Traditional Image of a Chinese City Fragment of the scroll Along the River During the Qingming Festival (Zhang Zeduan, 12th century) [Source: Wikimedia Commons, public domain]

Buddhism influenced the emergence of monastic and temple centers, which became important structuring elements of Chinese cities. Monasteries served not only as religious institutions but also as centers of education, charity, and community life, integrating spiritual functions into everyday urban activity [21]. These functions contributed to the diversification of urban space and the integration of social, educational, and religious activities within the urban structure.

A special place in Chinese planning traditions belongs to fengshui, a system aimed at harmonizing human activity with natural forces. Key aspects considered in urban planning included:

- orientation along cardinal directions;
- the relationship of the site to mountains and waterways;
- placement of key buildings in energetically favorable locations;
- the formation of a central axis as the conduit of straight qi energy [2, 8].

https://doi.org/10.51488/1680-080X/2026.3-16

These principles established a regulated spatial framework that ensured orientation, coherence, and consistency in urban planning decisions.

Mountains and rivers were regarded as active elements of urban composition: mountains symbolized protection and stability, while water represented vitality and prosperity. The central zone of the city was perceived as the area of maximum balance, influencing the well-being of the entire territory [2]. Thus, natural elements were incorporated into the urban structure as functional components contributing to environmental stability and spatial organization. The application of fengshui principles in urban planning is presented in Figure 2.

a) b) c)

Figure 2 - Application of Fengshui Principles in Urban Planning [Source: Shen Yuan, Tangdai, Wang Youdun. MIT OpenCourseWare, CC BY]

Particular attention was devoted to the creation of garden and park spaces, both public and private. Gardens functioned not only as elements of aesthetic improvement but also as philosophical models of harmony. Stones, water, vegetation, and pavilions formed a symbolic microcosm expressing Daoist and Confucian ideas about the unity of humans and nature [7, 2]. At the same time, such spaces contributed to the regulation of the urban environment, improving microclimatic conditions and supporting social interaction.

Thus, philosophical and religious traditions in China shaped not only the symbolic meaning of the city but also formed a coherent spatial framework that contributed to the organization, adaptability, and long-term stability of urban structures.

Historical overview of urban development in China.

Urban planning in China has a millennia-long history that reflects both technological advancements and the philosophical and ideological foundations of Chinese civilization. The evolution of cities proceeded through several major stages - from early state formations to the eras of the Han, Tang, and Song dynasties. Across different historical periods, the city was conceived not merely as a settlement but as a spatial model of the cosmos, embodying the political, administrative, and ritual organization of society. At the same time, this long-term development reveals a high degree of structural continuity, suggesting that Chinese urban planning evolved as a stable and reproducible system rather than a series of independent forms.

The conceptual foundations of the traditional Chinese urban canon began to take shape during the Zhou dynasty (1046-221 BCE). This period witnessed the emergence of early treatises that systematized principles of urban organization. Among the most notable are Kao Gong Ji, Li Ji, and Mengzi, which formalized rules of ritual spatial order, cardinal orientation, and urban hierarchy [4, 1]. These texts defined the ideal theoretical model of the city and served as normative frameworks for future capitals. These texts established not only theoretical models but also a set of reproducible spatial rules that influenced urban planning practices for centuries.

Liang Sicheng emphasized that the urban planning norms developed during the Zhou period continued to be applied throughout subsequent dynasties - Han, Tang, Ming, and Qing - remaining

https://doi.org/10.51488/1680-080X/2026.3-16

remarkably consistent over centuries [1]. This continuity demonstrates the existence of a stable urban planning model that was consciously preserved and systematically reproduced across different historical periods.

A fundamental element of traditional Chinese urban morphology was the rectangular residential compound siheyuan. The modular nature of this courtyard type shaped the block structure of cities, ensuring regularity and spatial stability [7, 14, 24]. This modular system contributed to the standardization of urban fabric and facilitated the replication of planning structures at different scales.

Key principles of the Chinese urban tradition included a regular grid layout, a clearly defined central axis, orientation along the cardinal directions, hierarchical spatial organization, and the use of siheyuan as the basic constructive and social unit. In capital cities, these principles were supplemented by a required set of ritual-administrative structures: the imperial palace, ancestral temples, altars, ceremonial gates, and market areas [25, 20]. The persistence of these principles across different dynasties indicates the formation of a unified and stable spatial system that underpinned urban development in China.

The origins of Chinese urban planning can be associated with early forms of organized settlements that appeared in different regions of ancient China. These settlements demonstrate the emergence of fundamental spatial principles, including orientation, functional zoning, and the relationship between built space and the natural environment. Over time, these principles were not only refined but also stabilized, forming a coherent system that was transmitted across generations [10].

City walls played both defensive and symbolic roles. They delineated the sacred and political boundaries of the urban territory, serving as material expressions of authority and cosmic order [2]. The modular structure of the traditional siheyuan dwelling is illustrated in Figure 3.

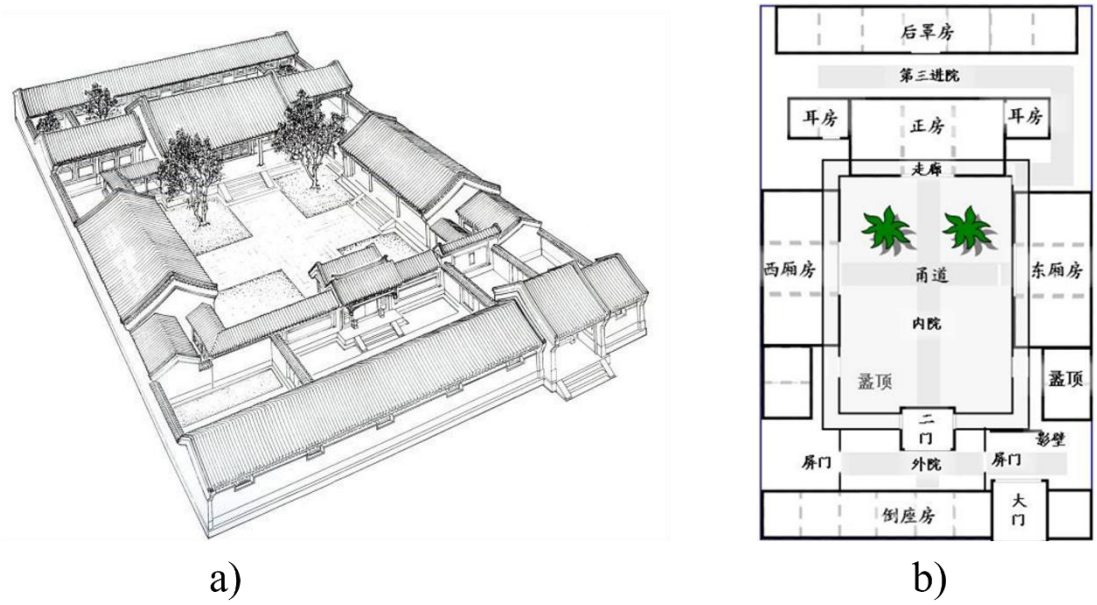

Figure 3 - Model of a Traditional Chinese House (Siheyuan) [Source: Wikimedia Commons, "Siheyuan model", CC BY-SA]

Elements of regular planning became especially pronounced in the capitals of the Han, Wei, and Tang dynasties. Symmetrical structure, strict orientation of major axes, and placement of the palace in the north with the market in the south formed an enduring urban canon [23, 2]. This configuration became a canonical model that was repeatedly implemented in subsequent urban developments. Comparative plans of major historical Chinese cities are presented in Figure 4.

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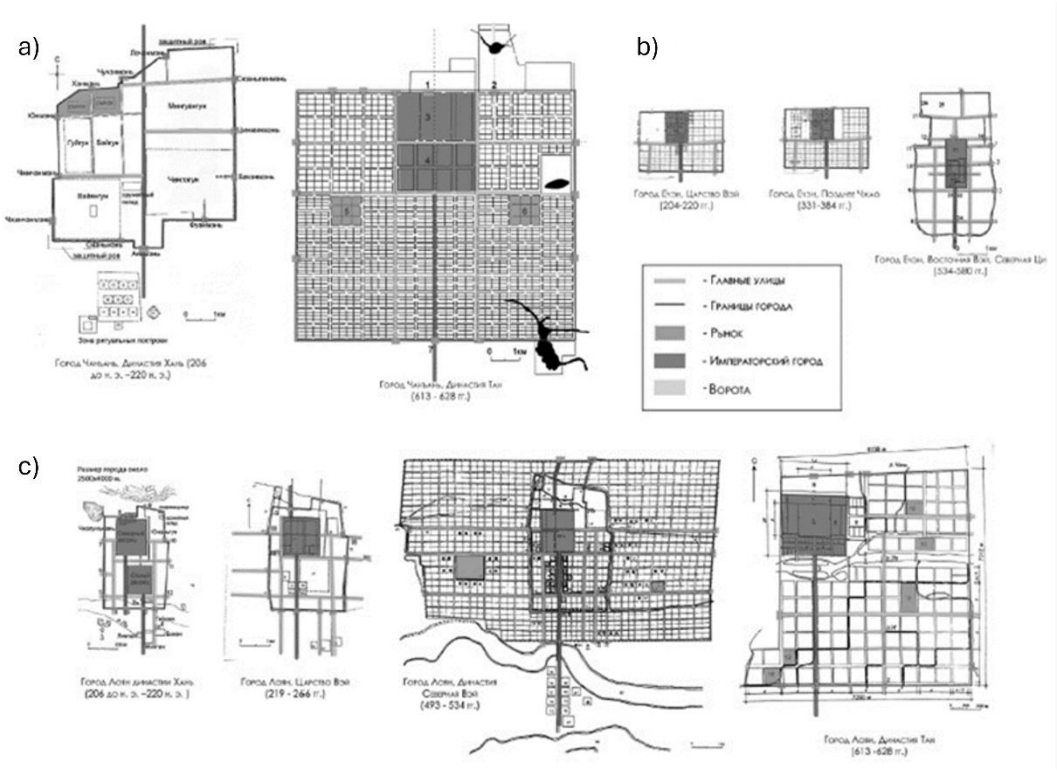

Figure 4 - Plans of Major Chinese Cities (a) Chang'an - Han, Sui, Tang dynasties (b) Luoyang - Han, Wei, Northern Wei, Tang (c) Ye - Wei, Later Zhao, Eastern Wei, Northern Qi [Source: Zaznova, E. G., Korotkova, K. O., & Ryabova, S. S. (2021)]

Archaeological studies of Chang'an and Luoyang, conducted by the Institute of Chinese Architecture and the Institute of Archaeology of the Chinese Academy of Sciences, demonstrate a high degree of correspondence between actual city layouts and the normative models described in Zhou-era treatises [26, 13]. This confirms not only the continuity of Chinese urban tradition but also the practical implementation of normative planning principles.

As Steinhardt (1990, 2019) notes, Chinese capitals represent one of the most consistent and enduring examples of a systematically reproduced ritual-administrative urban model in world history.

Thus, the historical development of Chinese cities demonstrates not a linear transformation of urban forms, but the long-term preservation and reproduction of a stable planning model based on clearly defined spatial principles.

Development of chinese cities across dynastic periods. Han Dynasty (206 BCE - 220 CE) The capital Luoyang is considered one of the most representative examples of urban planning during the Han dynasty. The city was organized as a large, symmetrical urban complex structured along a dominant north-south axis and characterized by strict functional zoning. The central sector contained administrative and ceremonial buildings, while residential quarters occupied the peripheral zones. Luoyang functioned not only as an administrative center but also as a major cultural and economic hub with a highly developed infrastructure [1].

During the Han period, a sophisticated administrative-ritual model of the capital emerged, comprising the palace precinct, outer administrative zones, and market districts. Scholars emphasize that this period crystallized an urban paradigm that would later be replicated in the capitals of the Tang, Song, Ming, and Qing dynasties [2].

Tang Dynasty (618-907 CE) The Tang era marks the zenith of classical Chinese urbanism. The capital Chang'an (modern Xi'an) became the largest city in the world at the time, with a population possibly approaching one million. Its spatial model strongly influenced the urban traditions of East Asia [5].

Chang'an was constructed according to the principles of fengshui and a highly regular orthogonal grid. The city was divided into enclosed wards (fang), with a meticulously organized street

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network and a rigid functional hierarchy: the palace and administrative complexes occupied the central area, while residential and commercial districts were located at the periphery. The spatial organization of Chang'an during the Tang dynasty is shown in Figure 5.

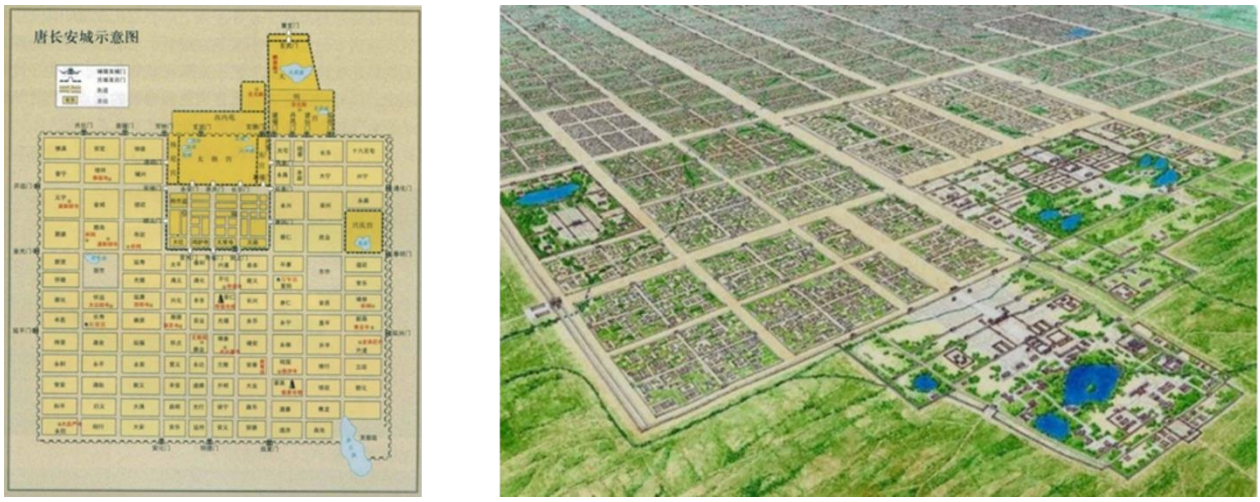

Figure 5 - Plan of Chang'an, Tang Dynasty (618–907 CE) [Source: Lishigushi LiveJournal, https://lishigushi.livejournal.com/8328.html]

A dominant north-south axis led to the Daming Palace, symbolizing both the cosmological axis of the empire and the central political authority. In the Tang era, the concept of the "sacred capital" as the center of the world was particularly pronounced [3, 5].

Song Dynasty (960-1279 CE) Urban development during the Song dynasty was shaped by the expansion of trade, the growth of artisanal production, and technological innovations such as printing and paper currency. The capital of Northern Song, Kaifeng, was among the most densely populated cities of the eleventh and twelfth centuries [12].

Kaifeng possessed an intricate system of water supply, extensive canals, and a high degree of urbanization. The emergence of bustling commercial districts and specialized craft quarters reflected a shift toward a more economically complex and socially dynamic urban structure [14].

Yuan Dynasty (1271-1368 CE) The Mongol Yuan dynasty introduced modifications to earlier urban models. The capital Dadu (modern Beijing) preserved the classical rectilinear layout but incorporated features characteristic of nomadic culture - broad open spaces, clear military orientation, and strong emphasis on strategic functionality [20].

Dadu became the prototype for the Ming capital, where the tripartite division into the Palace City, the Imperial City, and the Outer City would later be fully elaborated [13].

Ming (1368-1644 CE) and Qing (1644-1912 CE) Dynasties During the Ming and Qing periods, Beijing became the enduring capital of the empire and the quintessential example of a classical Chinese city. The most remarkable architectural achievement of this era is the Forbidden City, conceived as a symbolic model of the cosmos and an expression of imperial authority [12].

Beijing developed according to a strictly regulated spatial order:

- a dominant central axis,
- a rectangular street grid,
- symmetrical composition,
- ritualized zoning,
- a rigid hierarchy of spaces.

By the late Qing dynasty, Beijing had become the preeminent political, cultural, and ritual center of East Asia, preserving the urban structure shaped during the Ming period. The planning structure of Beijing and the Forbidden City is illustrated in Figure 6.

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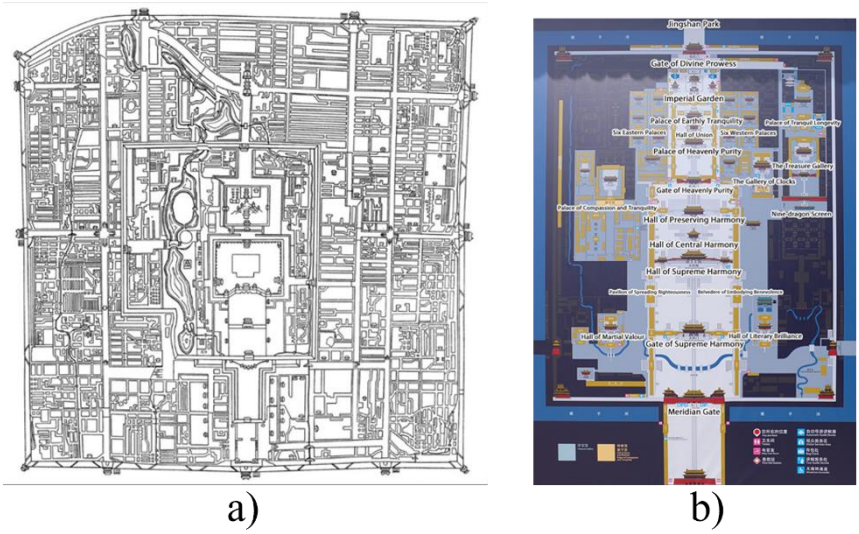

Figure 6 - Plan of Beijing, including the Forbidden City [Source: https://commons.wikimedia.org/wiki/File:Forbidden_city_map_wp_1.png]

Synthesis of Dynastic Urban Models Researchers emphasize that the remarkable longevity of Chinese urban forms across dynasties is explained by the preservation of a unified ideological and cosmological foundation [2, 5, 14]:

- the Confucian principle of centrality and hierarchical order;
- the ritual-administrative organization of urban space;
- the cosmological model of the empire as a reflection of Heaven and Earth;
- the perception of the city as a "material diagram of the state."

Despite changes in political regimes, technologies, and social structures, Chinese cities maintained a coherent spatial paradigm for more than two millennia.

The comparative analysis of major historical Chinese cities is summarized in Table 1.

Table 1 - Comparative Characteristics of Major Historical Chinese Cities

City	Dynasty	Planning Structure	Key Principles
Luoyang	Han	Regular layout, defined central axis	Hierarchical spatial organization; administrative centrality
Chang'an	Tang	Orthogonal grid; ward-based structure (fang)	Axial composition; functional zoning; spatial regulation
Kaifeng	Song	Developed canal network; commercial urban districts	Integration of economic functions within the urban structure
Beijing	Ming-Qing	Strict axial composition; imperial urban core	Cosmological symbolism; hierarchical organization; administrative coordination

Source: compiled by the authors based on historical and cartographic materials.

The Table 1 demonstrates the structural consistency and reproducibility of key planning principles across different historical periods.

The comparative analysis of planning structures of Chinese capitals across different historical periods reveals a high degree of consistency in the urban model. Despite changes in dynasties and socio-economic conditions, key principles of spatial organization - such as grid layout, axial composition, hierarchical zoning, and the presence of a ritual-administrative center - remained stable. This indicates the existence of a coherent and reproducible planning system that ensured the long-term stability and functional organization of urban territories.

Features of urban development and public spaces. Traditional Chinese urban development was formed on the basis of complex philosophical, ecological, and socio-hierarchical principles. Chinese cities evolved as integrated systems in which spatial organization reflected not only the practical

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needs of residents but also the spiritual, ritual, and cosmological worldview of society [2, 5, 27]. This combination of factors formed a coherent system in which spatial organization functioned as a mechanism for structuring urban life and maintaining long-term stability.

One of the key structural elements was the central axis, which determined the overall composition of the city. Symmetry, orientation to the cardinal directions, and clear functional zoning were essential features of traditional Chinese planning. Palaces, temples, and administrative buildings were concentrated in the central part of the city, while residential and commercial areas were placed on the periphery. This model reflected the social hierarchy embedded in Confucian concepts of order and role distribution [1, 21]. The central axis served not only as a compositional element but also as a structural framework that organized urban space and coordinated key functions of the city.

Traditional Chinese cities demonstrated a stable division of territory by function and social groups. Administrative centers were grouped around the palace complex, while residential quarters of craftsmen, merchants, and ordinary citizens were located in designated sections. Commercial districts developed along major roads and waterways, enhancing trade and integrating the urban economy with the imperial infrastructure [14, 3]. Such spatial distribution ensured functional clarity and contributed to the efficient organization of urban processes. The organization of public spaces in a traditional Chinese city is presented in Figure 7.

Figure 7 - Organization of public spaces in a traditional Chinese city [Source: Illustrations of Ancient China, https://pictures.pibig.info/29684-illjustracii-drevnego-kitaja.html]

According to the principles of fengshui, the city had to be harmoniously integrated into the natural landscape. Fengshui determined the placement of streets, buildings, and public spaces by considering the movement of qi, air circulation, landform, and the presence of mountains and watercourses [2]. Crucial principles included:

- avoidance of unfavorable topographic areas;
- south-facing orientation of key buildings;
- protective mountains located to the north;
- proximity to water systems ensuring the inflow of vital energy and economic prosperity.

Methods of rational natural-resource management played a central role in the sustainability of the urban environment. Systems of canals, ponds, artificial lakes, and temple water reservoirs served not only engineering purposes but also aesthetic and symbolic functions. They supplied cities with water, prevented flooding, and created a favorable microclimate [28, 2]. These systems contributed to the resilience of urban environments and supported long-term sustainability.

One of the most significant examples of large-scale integration of urban, agricultural, and transport infrastructure was the Grand Canal, which linked northern and southern China. It created a

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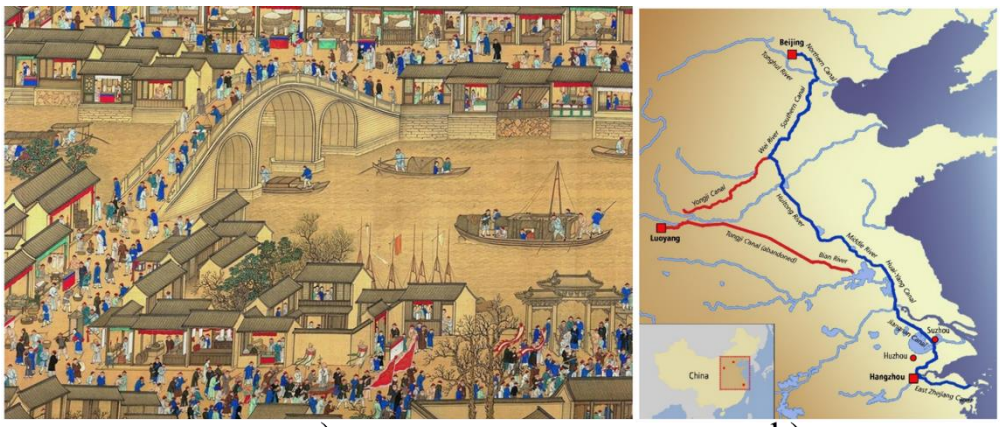
unique model of resource distribution, water regulation, and regional economic development [3]. Environmental adaptation also influenced material choices: wood, clay, brick, and stone were commonly used, depending on regional conditions. Liang Sicheng emphasized that these materials supported harmonious interaction between architecture and landscape, with wood dominating on plains and stone in mountainous regions [1,29]. This infrastructure demonstrates the large-scale integration of urban planning with resource management and territorial organization. The Grand Canal system, which played a major role in resource distribution and territorial integration, is shown in Figure 8.



a) b)

Figure 8 - The Grand Canal connecting the Yangtze and Huang He (Sui dynasty, 581–618 AD) [Source: https://ruchina.org/chinahistory.html]

Green spaces - including public gardens, siheyuan courtyards, and temple parks - played essential social and ecological roles. Chinese gardens were designed as microcosms of the universe, combining stones, water, and plants into symbolic compositions. They served as spaces for meditation, social interaction, rest, and aesthetic experience, expressing Daoist notions of naturalness [2, 14, 30]. These spaces contributed not only to cultural expression but also to environmental regulation and social cohesion.

In regions prone to erosion and strong winds, forests and protective green belts were established to stabilize soils and safeguard settlements. This was especially important in northwestern China, where natural conditions required additional protective measures [9]. Such measures illustrate the adaptive strategies embedded in traditional Chinese urban planning.

Chinese tradition viewed the city and its rural surroundings as a unified whole (cheng-xiang yiti). This integration ensured stable exchange of resources, food, and labor, thereby strengthening the sustainability of both urban and rural areas [3, 26]. It also strengthened the overall stability of the system and ensured continuous resource exchange.

According to leading scholars - Steinhardt (1990, 2019), Knapp (2000), and Guo (2015) - the durability of Chinese urban models was ensured by the interaction of three foundational factors:

- ideological core - the Confucian model of hierarchy and ritual order;
- cosmological framework - the orientation of the city as a model of Heaven and Earth, expressed through axial layout, symmetry, and ritual geometry;
- ecological appropriateness - sustainable resource management and the application of fengshui principles.

The combination of these components ensured the stability of Chinese urban forms over more than two millennia and defined the unique character and long-term resilience of traditional Chinese urban systems, ensuring their continuity across different historical periods.

Based on the analysis of the historical layouts of Chinese capitals, a structural model of the traditional Chinese city can be identified Figure 9.

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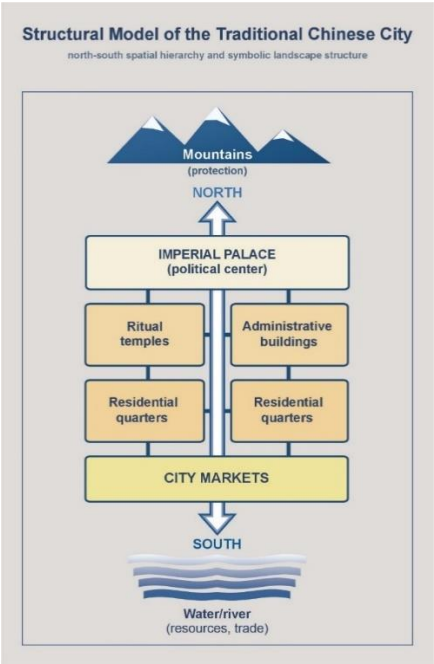

Figure 9 - Structural Model of the Traditional Chinese City [Author's material]

Rational spatial organization of the traditional chinese city.

The analysis of historical planning structures of Chinese capitals suggests that the stability of the Chinese urban model can be explained not only by philosophical and cosmological foundations but also by a high degree of rational spatial organization.

The traditional Chinese city was formed as a clearly structured system characterized by a regular street grid, a pronounced axial composition, and a hierarchical organization of functional zones. The central part of the city was occupied by administrative and ritual complexes, while residential quarters and commercial districts were arranged according to established spatial principles.

Such organization ensured clarity of spatial structure, facilitated coordination of urban functions, and contributed to the efficient use of resources. The regularity of planning made it possible to reproduce urban models across different cities and historical periods, which explains the high degree of consistency observed in Chinese capitals.

Thus, the cosmological symbolism of the Chinese city was closely interconnected with a rational spatial logic, forming a stable and adaptable urban system.

In contrast to the Chinese urban tradition, many European cities developed more organically as a result of gradual historical processes. Their spatial structure was often shaped by local conditions, economic factors, and incremental growth, resulting in more complex and less regular urban morphology.

The Chinese planning tradition, by contrast, tended toward normative spatial organization. The use of grid layouts, axial composition, and hierarchical zoning created a stable spatial model that was reproduced over many centuries. This allows the traditional Chinese city to be interpreted as a rational system of spatial organization, combining symbolic representation of cosmic order with an effective territorial structure.

4 CONCLUSIONS

The study of traditional Chinese urban planning allows the following conclusions to be drawn:

1. The long-term stability of traditional Chinese urban planning cannot be explained solely by philosophical or cosmological concepts. Alongside symbolic representations of the relationship

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between Heaven, Earth, and human society, the persistence of Chinese urban forms was also determined by a high degree of rational spatial organization.

2. Traditional Chinese cities were structured as coherent and reproducible spatial systems characterized by a regular grid layout, axial composition, hierarchical zoning, and clearly defined functional organization. These elements created a stable framework that facilitated coordination of urban processes, efficient use of resources, and long-term territorial management.

3. One of the key findings of the research is the identification of the dual nature of the traditional Chinese city. On the one hand, it functioned as a symbolic model of cosmic order; on the other, it operated as a rational spatial system supporting administrative organization and urban stability.

4. The research demonstrates that the durability of urban forms depends not only on cultural and symbolic factors but also on their capacity for systemic reproduction and spatial regulation. In this context, traditional Chinese urban planning can be interpreted as an early form of spatial governance embedded in urban form.

5. The principles of structural clarity, spatial hierarchy, and integration with natural landscapes observed in traditional Chinese cities remain relevant for contemporary urban planning, particularly in the fields of sustainable development, resource management, and territorial organization.

6. Future studies may focus on the transformation of traditional Chinese planning principles in modern Chinese urban development and on the potential application of these principles in different cultural and geographical contexts.

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https://doi.org/10.51488/1680-080X/2026.3-16

FUNDING

This research received no external funding.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ARTIFICIAL INTELLIGENCE STATEMENT

During the preparation of this manuscript, the authors used artificial intelligence tools solely for language editing, grammar checking, and text improvement. All scientific content, interpretations, analyses, and conclusions remain the responsibility of the authors.

AUTHOR CONTRIBUTIONS

Chernysh N.A. - Conceptualization, Methodology, Investigation, Formal Analysis, Writing - Original Draft, Writing - Review & Editing.
Belkova T.V. - Investigation, Data Collection, Visualization, Writing - Review & Editing.
Kozhobaeva S.T. - Validation, Resources, Writing - Review & Editing.

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https://doi.org/10.51488/1680-080X/2026.3-16

Received: 14 July 2026
Revised: 26 August 2026
Accepted: 5 September 2026

https://doi.org/10.51488/1680-080X/2026.3-16