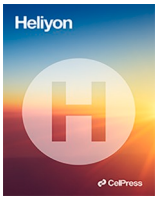
Heliyon 10 (2024) e27667

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon



Research article

Examining the transformation of postindustrial land in reversing the lack of urban vitality: A paradigm spanning top-down and bottom-up approaches in urban planning studies

Yan Gu [a], Yanju Yao [b], Wei Yan [c], Juanjuan Zhao [d,*], Teng Fei [e,**], Shulin Ouyang [f]

[a] The Environmental Sustainability Research Centre (ESRC), Fuzhou University, Xiamen, 361021, Fujian, China
[b] School of Computing and Mathematical Sciences, University of Leicester, Leicester, United Kingdom
[c] School of Engineering and Design, Technical University of Munich, Munich, 80333, Germany
[d] Faculty of Resource & Environment and Tourism, Capital Normal University in Beijing, Beijing, 100048, China
[e] Architecture Design and Research Institute of HIT, Harbin Institute of Technology, Harbin, 150001, Heilongjiang, China
[f] Academy of Art & design, Tsinghua University, Beijing, 100084, China

ARTICLE INFO

Keywords:
Industrial heritage
Creative cluster
Urban regeneration
Urban vitality
Policy-making
Bottom-up approach

ABSTRACT

A distinct rise of global interest in the role of cultural and creative industries in post-industrial urban development calls for the transformation of our industrial heritage into creative clusters. Despite many factories being removed in deindustrialization, some enterprises still preserve and reuse the former industrial lands. However, the inconclusive judgments on the performances of creative clusters call for an in-depth examination of the underlying mechanism of transforming dilapidated urban industrial spaces. In addition, few empirical studies have revealed the commonalities and differences of market entities employing both the top-down and bottom-up approaches during the redevelopment.

In this article, a multilevel transformation, and the consequent spatial performance in three postindustrial lands in Beijing have been examined based on big data analysis, field observation and in-depth interviews. We reached three conclusions. **First**, in addition to the angle of participatory planning, the deep exploration of specific market entities as an intermediate joint among different parties in protecting and reusing the postindustrial lands uncovers a distinct perspective of urban revitalization. **Second**, the finding of the enterprises' role in mitigating the conflicts between bottom-up and top-down approaches further testifies to a less-dichotomous perspective in urban regeneration studies. **Last**, though the examination of the multilevel transformation mechanism reflecting the difference between state and nonstate enterprises in property-led management, a generic paradigm behind the trend of relying on enterprises in revitalizing the large-scale postindustrial lands is revealed.

* Corresponding author.
** Corresponding author.
E-mail addresses: michael_gln@qq.com (Y. Gu), yanju.yao.martin@gmail.com (Y. Yao), yanweileo@hotmail.com (W. Yan), zhao@cnu.edu.cn (J. Zhao), feiteng@hit.edu.cn (T. Fei), 918016339@qq.com (S. Ouyang).

https://doi.org/10.1016/j.heliyon.2024.e27667
Received 13 October 2022; Received in revised form 10 February 2024; Accepted 5 March 2024
Available online 11 March 2024

Abbreviations

CCJQ	Chuangyi Chanye Jiju Qu (Innovation and entrepreneurship district)
ED	Edge density
ENN_MN	euclidean nearest neighbor
FAR	Floor area ratio
LPI	largest patch index
PR	patch richness
PRD	patch richness density
POIs	points of interest
SMEs	Small and medium-sized enterprises
SHDI	Shannon Diversity
SIDI	Simpson diversity
TA	Total area
TE	Total edge

1. Introduction

The transformation of industrial heritage sites into creative clusters has become an antidote for reversing the momentum of urban decline. The multidimensional benefits of creative clusters include place-making, motivating entrepreneurial approaches to culture and the arts, stimulating creativity and innovation, and endorsing democracy and diversity [1,2]. Since culture is considered to be the "fourth pillar" of sustainability [3], industrial landscapes should be regarded as resources and opportunities for developing new multifunctional landscapes that eventually lead to a sustainable urban environment [4]. For this reason, the sustainable transformation of industrial heritage sites into creative clusters remains a critical research agenda within cultural geography and urban planning.

During China's socialist period between 1949 and 1978, guided by the ideology of producer cities, the state enterprises in the second sector constructed self-contained work units (where public residence and service were also integrated) to function as basic urban cells [5–7]. Indeed, *"Since the post-1980 economic reforms, Chinese cities have experienced far-reaching industrial restructuring and spatial transformation. A decentralization of manufacturing industries from urban centers left many former industrial sites"* [8]. The enterprise reform in the 1990s further exacerbated the financial crisis for state enterprises [9,10]. In particular, the openness to competitive international enterprises left little room for declined state enterprises to survive in the market. Such a trend leads to either the reform of internal management in state enterprises [11,12] or their extinction, resulting in the transaction of land use rights to developers [13]. With the rise of the service and creative industries in the 2000s, dilapidated industrial buildings have also been preserved and reused as harbors of emerging industries [8,14]. The concept of CCJQ[1] (creative industrial clusters) started in 2004 in Shanghai and symbolizes a new paradigm compared to the previous primary approach in China's property-led urban development [15]. At the same time, the artist's BMPC (Beijing Municipal People's Congress) proposal in 2004 represents the official establishment of a postindustrial creative cluster in Beijing [16]. With the increasing fame of the 798 art district, the government has started to pay more attention to the value of preserving old industrial buildings in the name of heritage protection, a gradually formulated concept during the enterprise reform at the beginning of the new millennium.

In summary, state enterprises need transform from collective work units maintaining job-housing balance based on the planned economy to more independent competitors mainly engaged in pursuing market profit. Although the state enterprises in both processes have independence, the former ones make the self-contained management of work units independent from municipal management. In contrast, the latter enterprises produce the independent consciousness and pursuit of the creative transformation/reuse of old industrial spaces, which later also attracts the active involvement of nonstate enterprises.

However, there remain several shortcomings in existing studies on transforming industrial land into creative clusters. First, the critical dilemmas of organic or policy-led development still exist in cultural planning [17]. Correspondingly, how to synthesize top-down and bottom-up approaches remains a critical issue in spatial transformation. **Moreover,** few studies have focused on the role of different enterprises in reusing heritage buildings and examined the underlying transformation mechanism, which is key to capturing and comparing the rise of different creative clusters. **Finally,** little attention has been given to the temporal and spatial benefits of creative clusters after this transformation.

As an echo of the problems arising from top-down/bottom-up approaches, we aim to examine how enterprises act as an intermediate joint in reversing the lack of urban vitality through a multilevel transformation from a less dualistic/incompatible angle (Figs. 1, 5 and 6). We will first analyze the underlying transformation mechanism and, secondly, assess the consequent spatial performance. In addition, we will examine how the state and private enterprises revitalize urban life by integrating top-down/bottom-up influences. Moreover, the implications of our findings will be discussed to help rethink the existing gentrification debates in the urban regeneration context. Both qualitative and quantitative methods have been employed to reveal the particular roles of (non)state

[1] CCJQ is the abbreviation of "Chuangyi Chanye Jiju Qu", which means Innovation and entrepreneurship district.

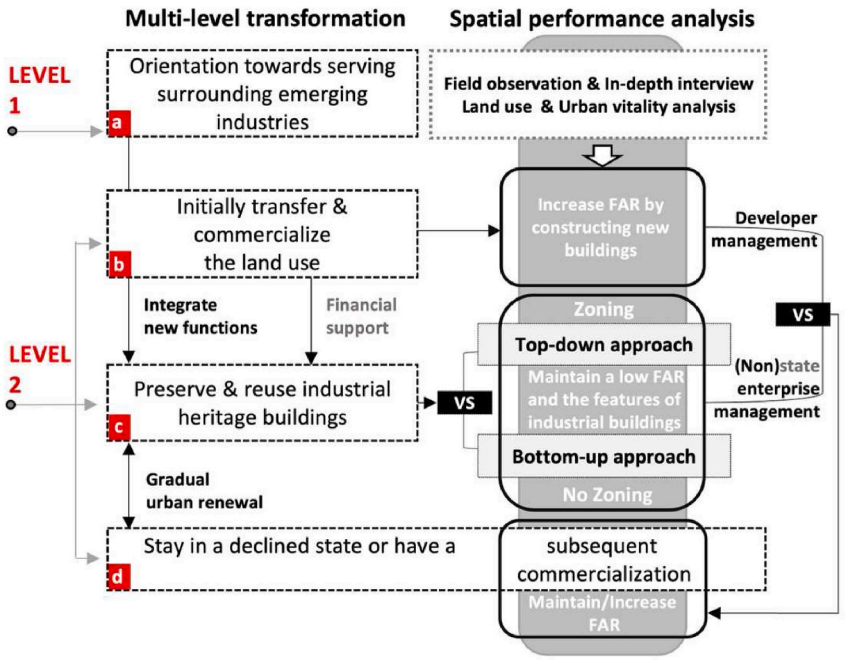


Fig. 1. The multilevel transformation mechanism employed by state enterprises to redevelop the postindustrial land. The nonstate enterprise (e.g. 898) lacks financial support based on land use transactions (LEVEL 2-b) for preserving and reusing the remaining postindustrial spaces (LEVEL 2-c), which is a key difference compared with the state enterprise in the above framework.

enterprises in transforming postindustrial spaces.

This study enriches knowledge of theory, methodology and policy-making in cultivating creative clusters to revitalize the postindustrial lands, which can be summarized as follows: **First**, in addition to the angle of participatory planning, through the deep exploration of specific market entities as an intermediate joint among different parties in protecting and reusing the postindustrial lands, a distinct perspective of urban revitalization is uncovered. **Second**, the finding of enterprises' role in mitigating the conflicts between bottom-up and top-down approaches further testifies to a less-dichotomous perspective in urban regeneration studies. **Finally**, though the examination of the multilevel transformation mechanism reflects the difference between state and nonstate enterprises in property-led management, it reveals a generic paradigm behind the trend of relying on enterprises in revitalizing large-scale postindustrial lands.

The remainder of this paper is organized as follows: Section two reviews the existing studies and summarizes their limitations. We follow this by introducing our methodology in Section three. Section four presents the results of our analysis. Finally, we will discuss the research findings and reach our conclusions and outlooks.

2. Literature review

2.1. Debates in theories and practices of urban regeneration based on transforming former industrial land into creative clusters

A fundamental predicament in cultural planning revolves around whether urban development should be an organic or policy-led process [17]. Scholars have asserted that while the organic process fosters social mix and diversity, policy-led initiatives inevitably result in gentrification [18,19]. Morgner reinforces that conceptual discussions on the emergence and decline of art districts frequently rely on explicit or covert use of the gentrification model [20]. **However**, Gainza reveals that the policy-driven culture industries in San Francisco do not result in a veritable replacement of lower classes by upper ones but resonate with a deteriorated socioeconomic process [21], reflecting a variegated portrait of the gentrification phenomenon. **Consequently**, the gentrification perspective overlooks the comparison of diverse spatial performances among the corroborating cases and neglects their inter-related influences in making urban renewal policies to attract creative industries [22,23]. **Furthermore**, the actual socio-spatial interaction beyond the dualism debates on organic and policy-led development lacks adequate exploration.

Another sizeable gap between theories and policies in urban regeneration based on creative industries lies in debates and criticisms of culture consumption and production. Florida demonstrates the benefits of the creative class in promoting consumption and urban regeneration [24,25], fostering higher enthusiasm from the government in planning strategies for creative industries. **On the other hand**, other scholars' trenchant criticisms remain fixed on stimulating consumption or competition without adequate consideration of grassroots initiative or their fundamental needs [19]. Peck contends that the creativity strategies of elite actors are pre-constituted, accompanied by policy practices "easily dis-embedded and de-territorialized from their centers of

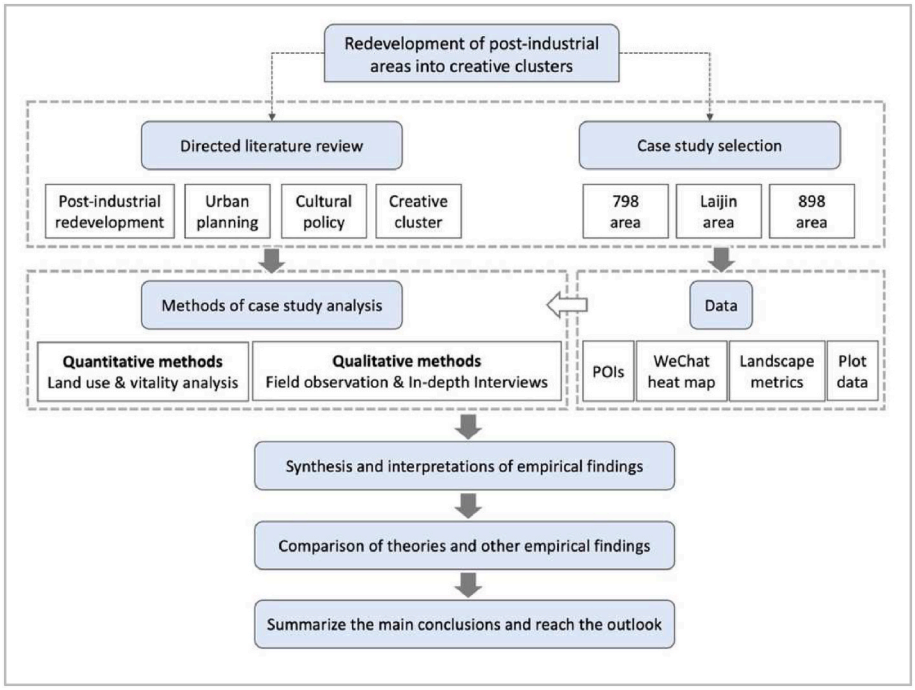


Fig. 2. The methodological framework of our study[21].

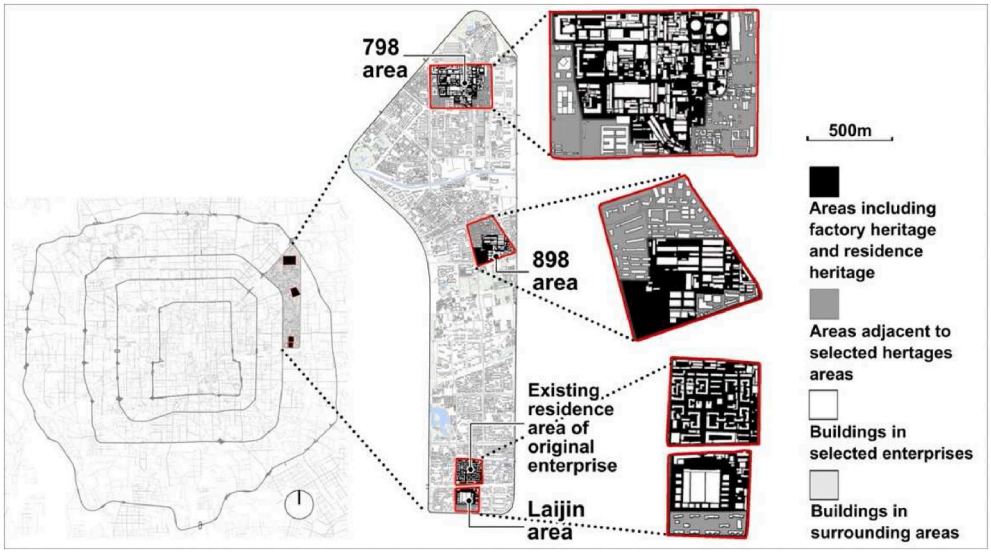


Fig. 3. Three selected enterprise areas in eastern Beijing (The map data is collected in 2016 from the open data platform Baidu map).

production [26]." Thus, Pratt argues that the false dualism between cultural consumption and production causes critical criticism [27].

The sustainability of creative clustering relies on effectively integrating public policy with organic change and policy-led initiatives, while also garnering support **from the local community and business interests** [17]**.** The success of transforming industrial heritage spaces into mixed-use clusters or tourist destinations for urban renewal is supported by prior studies and examples from Portugal, Romania, Seoul, Incheon and Istanbul, demonstrating the positive impact of culture-led regenerations on the community's cultural, social, and economic well-being, while preserving traditional architecture and balancing cultural and economic pursuits through multi-disciplinary policies [28–36]**.**

Nevertheless, there exist inconclusive judgments on the performances of Chinese creative clusters transformed from

industrial areas/heritages. While many studies criticize their lack of organic development, others regard those clusters as attractive and successful. **On the one hand,** scholars question whether Chinese creative clusters can overcome duplicate construction and government intervention for organic development [37–39]. The Shanghai CCJQs' property-led mode focuses on providing office properties for rental income rather than helping creative industry companies, resulting in a cultural consumption-led approach that lacks on-site synergy and creativity and exacerbates gentrification effects [40–42]. Chou also argues that constructing cultural spaces in Beijing is a state-sponsored effort that prioritizes infrastructure construction and institutional framework for world-city branding, ultimately hindering Beijing's organic development of creative cultural spaces [38]. **On the other hand**, the present-day trend of innovation-based urban renewal has confirmed the contribution and appeal of creative clusters in China. The 798 Art District, hailed by Currier as a haven for artists and designers, as well as a leisure destination for visitors, serves as an indication of the rising pluralization of power in readjusting original urban plans [43]. The success of 798 has prompted the Chinese government to prioritize the preservation and renovation of old industrial buildings, which is considered the epitome of transforming industrial Beijing into a global metropolis [8,44]. Berta et al. also highlight how each tier of government, developers, designers, and the local public interact efficiently to regenerate the Shougang area's industrial estate in Beijing [45]. Additionally, converting old manufacturing spaces on Moganshan Road in Shanghai into a creative cluster was taken as an organic process influencing the local economic and cultural interests [46].

2.2. The bottom-up and top-down approaches employed in the spatial transformation to revive urban spaces

Two major perspectives exist to demarcate the differences between bottom-up and top-down approaches. **On the one hand**, the top-down approach originates from regional planning and global economic and cultural influences, with the central government driving policy decisions [47–50]. Conversely, the bottom-up approach favours local actors from municipalities, entrepreneurs, and communities, with grassroots activities constituting the bottom-up regeneration, while officials from city authorities oversee top-down events [14,51,52]. **On the other hand**, Smith highlights the explicit contrast between the "planned versus spontaneous" nature of bottom-up and top-down actions [53]. Plevoets and Sowińska-Heim classify the user-led adaptive and spontaneous reuse of heritage buildings into bottom-up activities [54], opposing large-scale commercial and planned redevelopment. **In our research**, the planned top-down land use, particularly influenced by the government policies or command economy, is opposite to the spontaneous bottom-up activities in a market-based environment.

The debate over bottom-up versus top-down approaches is often framed in dualistic terms, with many advocating for the former. Proponents of bottom-up approaches have praised their significance in promoting plurality, innovation, and dynamism in contrast to the more dominant top-down approach [43,55]. Bottom-up actions have proven beneficial in preserving industrial heritage in the Ruhregbiet [56] and can lead to unexpected, innovative, and surprising behaviors [57]. Grabkowska highlights the potential of bottom-up processes in urban regeneration to avoid displacement effects [52], despite criticisms from Pissourios about their weaknesses in legislation, efficiency, and scope [50]. Dias et al. contend that effective bottom-up processes that incorporate active local participation contribute significantly to achieving social, economic, and environmental sustainability [58]. The superior performance of the bottom-up approach in comparison to the top-down approach with regard to citizen participation, promotion of development quality, and the amplification of cultural value, has also garnered the attention of scholars [59–61].

Contrary to the dualistic debate, scholars are attracted to explore a synthesis or transcendence of the dualistic approaches, as they recognize the complementary role between these two approaches. Naess asserts that a higher level of coordination is necessary for sustainable development apart from the bottom-up approach [62]. The core of the meta-governance discussion lies in the interaction between the hierarchical top-down government policy and horizontal bottom-up governance policy [63]. Collaborative workshops that combine top-down and bottom-up methods are a valuable model for community participation in sustainable urban regeneration, promoting cooperation between the government and the public through consultation and negotiation [64–67]. In addition, Elbakidze et al. suggest that the interaction of both approaches can encourage collaborative learning [68]. Furthermore, to criticize the top-down/bottom-up dichotomy, Smith demonstrates the deficiency of the incompatible concepts that confined the multidimensional process between two actors according to their vertical positions within a strict hierarchy [53]. Though enriching the theory of the bottom-up approach, Mens et al. explored from a less dichotomous angle to reveal how social entrepreneurs reuse the former industrial spaces through mechanisms compatible with state and market consensus to simultaneously create social and financial values [69].

2.3. Urban vitality analysis to measure the sustainability of the urban environment and its relation to urban landscape metrics

Jacobs' seminal work, "The Death and Life of Great American Cities," [70] triggered a hotly debated topic on the significance of creating urban vitality. Urban vitality, as defined by Landry, represents the raw power and energy within a city [71], signifying its attractiveness and competitiveness. The efficient stimulation of urban space use is also considered an indicator of a sustainable and habitable urban environment by scholars [72,73]. Four key factors-the land use mix, high density, fine grain, and permeability were

[2] Our research comprises three types of primary sources, namely, big data, interview data, and field observation data. **First**, the big data contains POI data, heat map data, and land use map data, which are open data sources collected on websites. We also drew some of the map data based on our observation work to make the landscape metrics analysis more accurate. **Second**, it has been ensured that the collection of observation data does not compromise individuals' privacy information. **Finally**, we conducted in-depth interviews with various participants, and all parties granted us permission to analyze the related data and publish the research results in journals.

identified as influencing urban vitality [74,75]. **However**, these studies primarily relied on researchers' observation and description in field studies to define vitality, which lacks a more comprehensive perception of the large-scale milieu. **In contrast**, Zeng et al. decomposed urban vitality into four aspects - density, liveability, accessibility, and diversity - based on the annual statistics of entire urban areas [76]. Land use mix analysis using point of interest (POI) data and fine granularity analysis with online map data have been widely employed to examine the urban vitality of specific cities and regions in China [77,78]. Xia et al. compared day and night urban vitality by using entropy analysis of POI data and lighting data [79]. **Nevertheless**, annual statistics and POI data are relatively static, indicating that real-time space uses in different locations and at specific times of day or seasons have not been fully studied. Moreover, comparing POI data and lighting data may result in errors due to their distinct features. Wu et al. traced the GPS sensors attached to 480 volunteers in a suburban residential community to study individuals' interactions with mixed land uses and traffic systems [80]. **Although** these scholars successfully capture the real-time space use by specific individuals, big data on the dynamic locations of large-scale population densities may be more promising in revealing the urban vitality driven by regeneration in different creative clusters.

On the other hand, Meng and Xing identified that changes in urban vibrancy are highly variable and heavily reliant on multilevel urban landscape characteristics, including places, land use, and single and multiple landscape elements [81]. Global statistics indicate a significant positive spatial autocorrelation between urban land-use intensity and urban vitality [79]. Among the three aspects of the urban landscape, the city plan pattern has the most significant effect on stimulating vitality, followed by the land use and the patterns of building form. In addition, convenient transportation, a compact block form, diverse buildings, mixed land use, and tall buildings are the primary characteristics of vibrant blocks. On the other hand, the effects of the urban landscape exhibit spatial variations and apparent diurnal discrepancies [82].

2.4. Summary

In summary, further exploration is necessary for the five shortcomings identified in existing studies. **First,** the theoretical debates on urban regeneration modes remain inconclusive, and more empirical work is necessary to judge their performances in motivating creative clusters. **Second,** the interrelation between top-down and bottom-up approaches and their corresponding consequences requires further clarification. **Third,** temporal and spatial variables of creative clusters based on transforming former industrial land have not been adequately considered. **Fourth,** few studies have examined the generic transformation path/mechanism employed by different enterprises and its role in preserving and reusing heritage buildings in postindustrial spaces. An integrated paradigm that examines general structures for land use transformation and its performance is helpful in capturing and comparing the rise of different creative clusters. **Lastly**, to comprehensively monitor and assess the real-time and multi-scalar vitality within urban environments, combining landscape metrics with big data, such as WeChat heat map, is necessary in the information age.

3. Methodology

This study begins with a review of the relevant global literature on the redevelopment of postindustrial areas into creative clusters, focusing mainly on four key topics: postindustrial redevelopment, urban planning, cultural policy, and creative clusters. Subsequently, we select three typical case studies for empirical research. To reveal the underlying mechanism and outcomes of the transformation, we employ integrated analysis methods that combine quantitative assessment (land-use analysis and vitality analysis) and qualitative research methods (field observation and in-depth interviews). Landscape metrics and POIs are used to analyze land use spatial patterns, while real-time population density analysis (based on the WeChat heat map) is used to measure urban vitality to represent spatial performance after the transformation. Field observations supplement additional land use information and the actual spatial usage of individuals. In-depth interviews serve as an essential supplement to deepen the understanding of the complex situation among different stakeholders and processes during the transformation. Finally, we synthesize and interpret the empirical findings, summarizing the commonalities with and differences from existing studies (Fig. 2).

3.1. Selection of three study cases and data sources

For this study, three cases are selected: these include areas of 798, 898, and Laijin, in which similar functional transformation goals of promoting creative and high-value-added industries by preserving and repurposing industrial heritage spaces have been pursued. These cases are situated in the eastern region of metropolitan Beijing, between the fourth and fifth rings (refer to Fig. 3). By comparing 798 and Laijin under the management of state enterprises, we aim to uncover the differences between top-down and bottom-up approaches. Furthermore, we compare the outcomes of top-down management by state and private enterprises through the comparison between Laijin and 898. To collect data, we use points of interest (POIs) and plot data from Baidu map app (an open data platform), and the open heat map data from the WeChat app which has a population of 1 billion customers for every day. In central urban Beijing, a greater proportion of app users suggests a more dependable and real-time observation of population density. Additionally, the heat map data has a precision of approximately 15 m, rendering it suitable for detecting land use performance at a small scale.

3.2. Quantitative methods: Land use analysis based on landscape metrics and POIs, and vitality analysis based on heat map data

The principal transformation process of three study cases occurred between 2011 and 2018, reflecting an experiment phase of postindustrial land regeneration spearheaded by enterprises before the global pandemic. In order to scrutinize and contrast the process

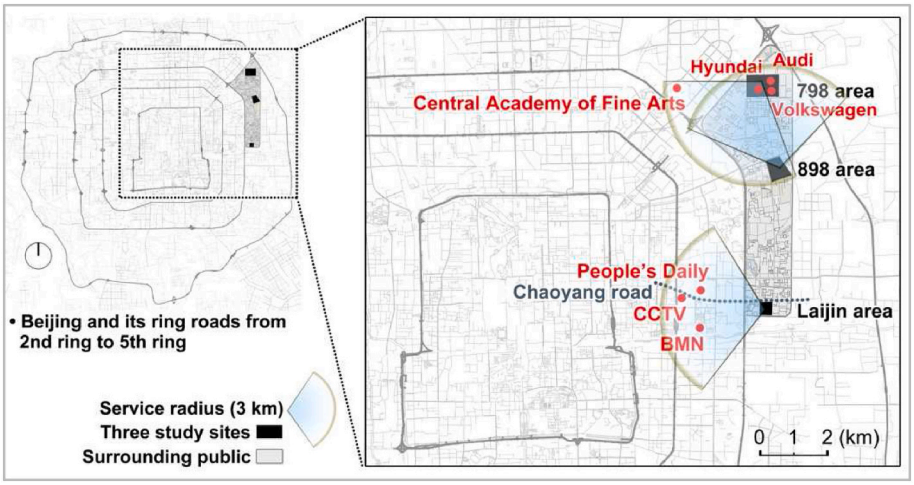


Fig. 4. The emerging industries rising in surrounding urban environments to generate spillover effects on the selected enterprises.

of land use transformation in postindustrial spaces, historical records in literatures and maps are compiled to buttress the relevant analysis work, which is further verified based on the google historical map.

Additionally, Fragstats was used to analyze landscape metrics, which include area and edge metrics, aggregation, and diversity metrics. To calculate the diversity metrics, we first assigned the major function of each patch by identifying the major type based on Baidu and Tencent map data. In addition, the urban environment of the selected study cases was divided by a GIS fishnet with a fine granularity of (80m×80m), which matches the general scale of industrial buildings in the three enterprises. The land use mix (eight main functions and 26 subfunctions) within each grid was examined using entropy calculation of POI data, following the approaches of Li et al. [83] and Gu et al. [84].

Moreover, the real-time population density was inferred based on analyzing kernel density points collected from the WeChat heat map. By combining these data with the existing stable residence population in specific communities, we are able to estimate the number of people represented by values of kernel density points. Expressly, the heat map data at 22 o'clock accurately reflects the residence population density. Therefore, we inferred that for each density-point value, 40 persons in January and 80 persons in August are representative, enabling us to calculate the actual population densities. Drawing upon the aforementioned data collection efforts, we can compute the population densities in every fishnet grid, as well as those in functional zones of varying scales.

3.3. Qualitative methods: field observation and in-depth interview

First, the industrial buildings and their transformation were recorded with on-site photos. The space used by renters and visitors during work and leisure was also observed. The current space zones and their distinct functions of each case study can be accordingly identified. Moreover, in-depth interviews with enterprise managers and other involved stakeholders (e.g. people who operate art studios) were helpful for determining how the transformations of different zones relate to each other and the roles of state enterprise management in different scenarios of preserving and reusing industrial spaces. These observations and interviews provided useful insights to deepen our understanding of the complex transformation process.

4. Empirical results

4.1. First level of space use transformation: Adaptation to external influences by receiving urban emerging industries

The first level of the space use transformation for the enterprise work units is closely related to the fast-growing emerging industries in the surrounding urban areas. To some extent, the spillovers of intellectual activities and development of surrounding commercial and public communities within a 3-km radius have been accommodated by the empty spaces of decommissioned factories. To survive in the market, state enterprises have had to adapt their land use mode from the lossmaking producer in the second sector to a cluster that absorbs diversified firms and businesses in creative, innovative, and leisure industries. Therefore, the managers of former state enterprises in 798 and Laijin have transitioned to the providers of land use services. In contrast, significant shares of stock rights in 898 were transferred to nonstate enterprises. Nevertheless, the motivation for land use transformation in 898 arises from industrial co-ordination with surrounding areas, which is similar to what the other two clusters have experienced in the first level.

As shown in Fig. 4, the 798 area is located near the Central Academy of Fine Arts (CAFA). In 2001, some professors at CAFA rented the empty industrial buildings in 798 as their studios to create large-scale artwork, which drew more artists and designers to set up their studios there. With the increasing establishment of well-developed public services (e.g. exhibiting, catering, and shopping), other large innovative enterprises (e.g. Qihoo 360, Hyundai, Volkswagen, and Audi) subsequently moved their offices to the 798 area, which

promoted space renovation in and around this creative cluster. Similar to 798, Laijin benefits from its close proximity to the largest media groups in Beijing. In 2009, Laijin began its project to preserve and reuse former industrial spaces as office spaces for media and design SMEs or list companies with close business cooperation with People's Daily, CCTV, and BMN. Finally, the later renovation of industrial space in 898 had the advantage of its proximity to automobile enterprises in 798. This attracted the Guazi Used Car Direct Sales Network to establish their corporate headquarters and exhibition center in the 898 area.

For state enterprises in charge of 798/Laijin areas and the nonstate enterprise managing 898, excellent accessibility to integrate into a network of emerging industries is a prerequisite for reusing postindustrial spaces. On the other hand, enterprises' initiative to recover their economic viability leads to pragmatic and open tactics for reusing industrial buildings. Although the enclosure is still impermeable, the gating system of each enterprise has become less rigid, encouraging more public visits and presenting a new gesture for attracting potential tenants. As of 2018, there were 110 enterprises in Laijin and over 400 enterprises in 798. Both have been ranked in the "First batch of 33 Beijing's municipal cultural and creative industrial demonstration parks", which, in turn, brings more advantageous policies in regeneration subsidies and corporate tax, among others.

4.2. Second level of space transformation: A general land use differentiation process to reflect the commonalities and differences of (non) state enterprises

The land use transformation in the three enterprises experienced a similar differentiation process, consisting of three interrelated

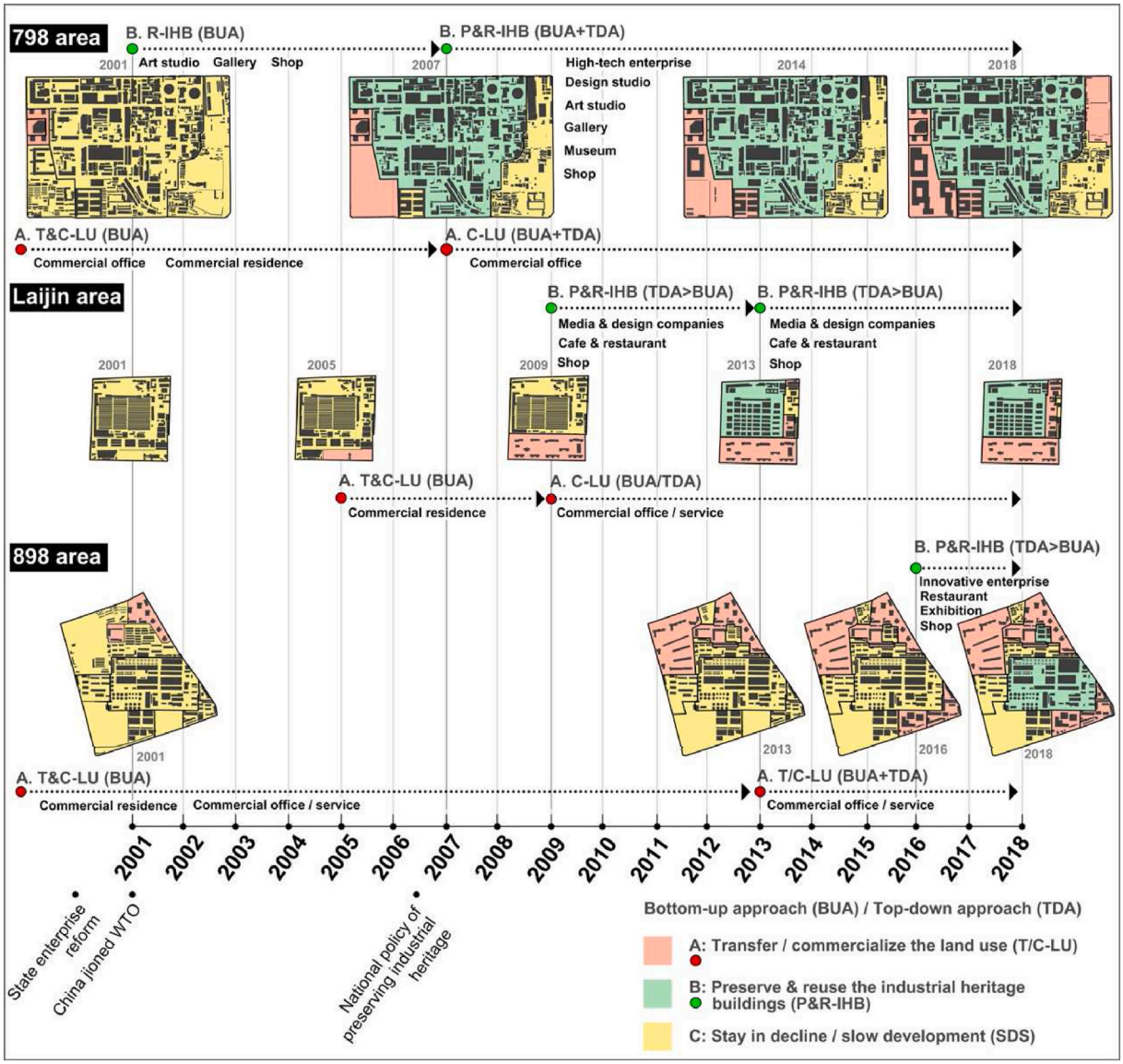


Fig. 5. Gradual land use differentiation along the time axis in three enterprises.

paths. Fig. 5 reflects the transformation timeline of the different plots within each enterprise and the type of land use to which it was converted. The differentiation of space use started from the fragmentation of boundary spaces (investment with high value) with the transfer of the land to commercial projects. High-rise office and residential buildings replaced the old industrial buildings, which created higher FAR with more business revenue. During this process, other parts of each enterprise remained in a decommissioned state. Second, the preservation and reuse of postindustrial buildings belong to a different path, which is still under the complete control of original enterprises in 798 and Laijin. Although a nonstate enterprise had occupied the large stock rights of 898, the heritage protection policy still exerted similar influences through assigning the privilege of land use tax and limiting the destruction of post-industrial buildings. Finally, some other shabby places were undergoing slower development, which led to later land-use commercialization. For example, the eastern borders of the 798 and Laijin areas and the southwestern boundary spaces of the 898 area remained in a slower development state than the other parts of the three enterprises.

Although the fragmentation, transfer, and commercialization of boundary spaces suggest a loss of control over their land assets among the three enterprises, the regeneration of old industrial buildings in B areas (Fig. 5) also relied on these changes to acquire sufficient funding/subsidies. For instance, the funding for the transformation of Laijin cultural creative industrial park partially came from the land transfer on its southern border, where new high-rise commercial residence buildings have entirely replaced the original industrial land use. This is also one of the reasons why the preservation and transformation of old industrial zones occur later than that of the transfer and commercial projects on enterprise borders. Although nonstate enterprise 898 lacks the original land use right, it still enjoys the same policy support for developing cultural creative industry and has the commonality in the land use sequence with the other two clusters.

On the other hand, many boundary spaces with a relatively lower value of the investment in each enterprise might initially stay in decline. With the recovery of enterprise development, some decommissioned boundary spaces were gradually transformed under the (non)state enterprise management. In the southwest of the 798 area, the new high-rise edifices were constructed under the regulation of the same managers as the industrial preservation area. Similarly, the northern and eastern borders of the Laijin area also developed new commercial service functions under the management of the original state enterprise. Due to the later start of the development of 898, there were no signs of boundary commercialization directed by the nonstate enterprise until 2018. However, 898 has started to regenerate the old buildings in southern C areas (Fig. 5) since 2019, which suggests a similar structure of land use differentiation among state and nonstate enterprises.

4.3. Transiting between bottom-up and top-down approaches to preserve and reuse postindustrial spaces

4.3.1. An intermediate joint of complex interrelations between different parties as well as the corresponding approaches

The top-down and bottom-up approaches take over the transformation of former industrial spaces by exerting influences through the specific enterprise functioning as an intermediate joint, which is interrelated with exogenous economic and policy factors as well as endogenous factors transferred by the enterprises to the tenants (Fig. 6). **On the one hand**, all enterprises navigate between market-based bottom-up and policy-led top-down approaches to combine the exogenous factors to repurpose postindustrial lands. **First**, the flourishing market has filled these spaces with diversified emerging industries that cater to the increasing demand for cultural and leisure activities in a bottom-up path. This path was initially accepted by state enterprises, as more autonomous entities, to survive economic reform and free competition. **Second**, policies[3] that regulate postindustrial land use provide official standards for heritage protection, reuse, and financial support, offering a top-down approach implemented by all enterprises. **Therefore**, the reuse of postindustrial spaces involves cooperation among the enterprise, government, and market to integrate the preservation of industrial heritage with the promotion of local economic viability. With a new trend towards high-value-added-creative and high-tech-innovative firms being favored by policy and capital, (non)state enterprises are initiating commercial operations that accommodate potential renters while also adhering to policy-led regulations and tax incentives aimed at preserving the industrial heritage. The above practices indicate the need to preserve historic buildings showcasing industrialization history, while also requiring approval for repurposing industrial spaces of lesser historical or cultural significance to prevent any damage.

On the other hand, (non)state enterprises function as intermediaries, transferring external influences into the internal milieu within each cluster. In addition to receiving the exogenous top-down/bottom-up approaches from the government and market, enterprises establish an endogenous interrelation with tenants that integrate opposing strategies. **First**, the top-down approach implemented by the enterprise covers a broad scope of factors, while the bottom-up approach mainly focuses on how enterprises and tenants repurpose old spaces to transform postindustrial land. Moreover, the tenants are arranged into functionally designed zones under the top-down approach, whereas the decentralized and mixed locations of tenants follow the bottom-up approach. Most tenants in creatively clustered, zoning-designed areas (such as Laijin and 898) can only renovate building interiors, whereas those in clusters that integrate diverse functions in each building have greater flexibility in reusing heritage spaces, including landscapes and building exteriors (such as 798). **Second**, during transformation, the original land use rights and land transfer revenue controlled by state enterprises (such as 798/Laijin) provide them with greater initiative and radical capability compared to nonstate enterprises (such as developers in 898) that need to first acquire equity. **Finally**, the interrelations between factors dominated by enterprise, tenants, government, and market profoundly impact the de facto effects of bottom-up and top-down approaches. By analyzing the diagram

[3] Guidelines for the protection and reuse of industrial heritage of Beijing, (No. 32 [2009] of Beijing Municipal Bureau of Industry Promotion), Beijing municipal commission(bureau) of the economy and information technology. This guideline aims to, with different intensities, preserve and reuse the post-industrial buildings based on three classification standards.

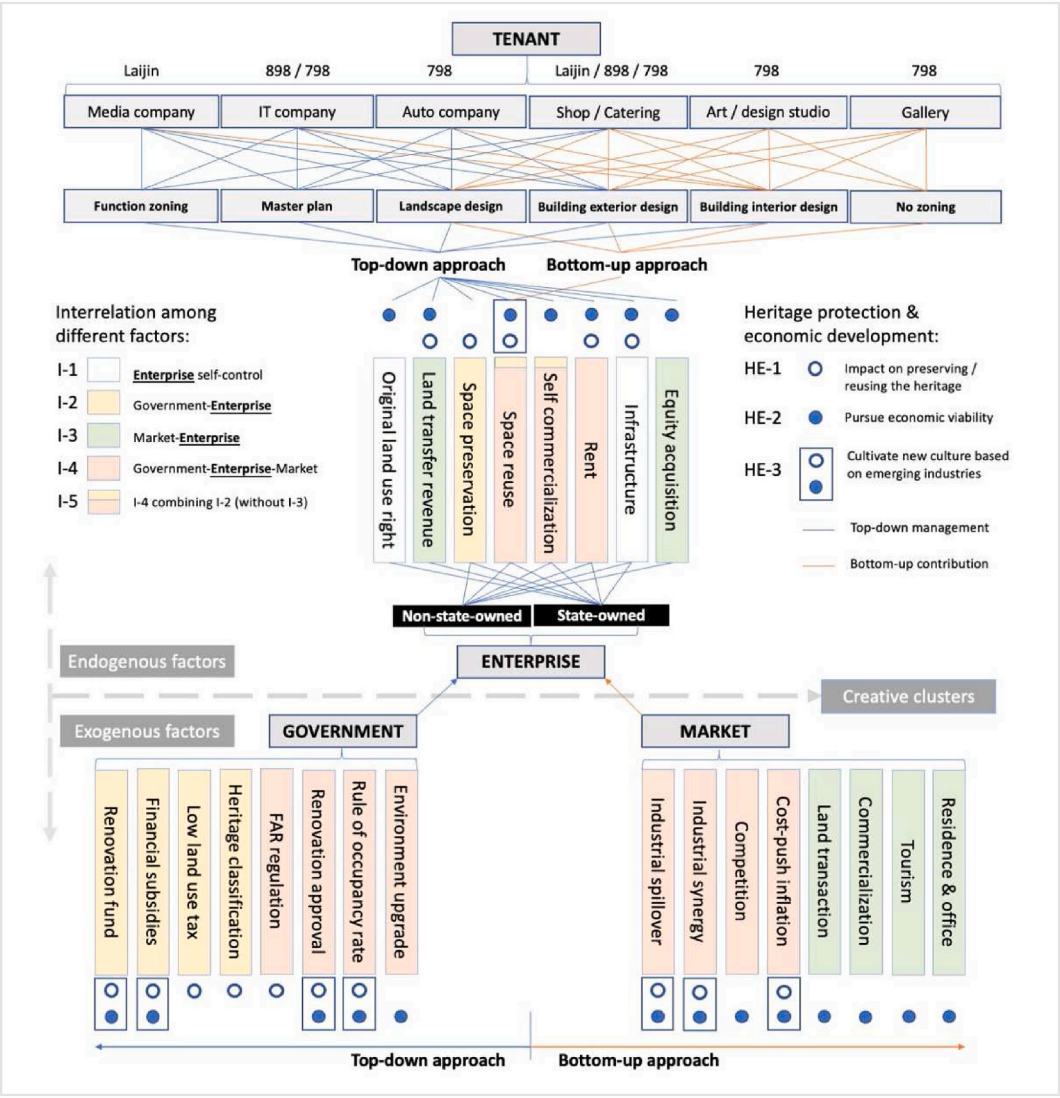


Fig. 6. The enterprise functioning as an intermediate joint between the government and market as well as between them and the tenants.

(Left) and examples of interrelated influences (Right) in Fig. 7, we can understand how these factors specifically produce different effects on renting prices and land use transformation.

Regarding renting price, the government policy restricts the FAR to under 1.0, limiting the total land use for tenants in a cluster and protecting the industrial attributes of heritage space. However, to balance out the effect of cost-push inflation and low FAR limitations, the enterprise raises rent to acquire higher revenue and compete with other commercial communities filled with high-rise office buildings. Ultimately, only artists, designers and firms with more competitiveness remain or are integrated into further development, resulting in a dynamic replacement of tenants that favors a market-based bottom-up approach, serving high value-added tenants with more financial strength. Our analysis emphasizes the significant role of the market in achieving a complete picture of the transformation of postindustrial land, as opposed to solely criticizing the potential for gentrification. Moreover, while the market focuses on revenue-driven land reuse, cultural policies shed light on preservation-led land use regulation. To encourage larger density of firms and make full use of space, the government agency sets 70% as a lower threshold of occupancy rate for selecting well-regulated creative clusters. Furthermore, the industrial spillover/synergy integrates more related firms into the creative cluster, promoting its functionality within the district (Fig. 7).

The differences between state and nonstate enterprises presented in Figs. 1 and 6 reflect the change in their respective roles in urban regeneration. In Fig. 1, state enterprises transfer the land use rights of borders to developers in commercial projects. As state enterprises gain more strength, they begin to initiate the commercialization of border space without the need for land transactions. In contrast, some developers shift their focus from the commercialization of postindustrial lands (office/residence) to gradually

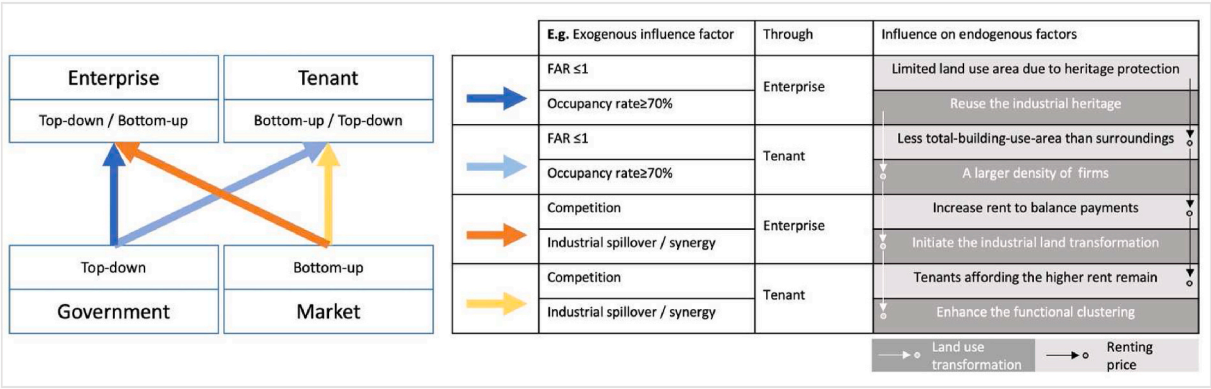


Fig. 7. The interrelated exogenous influences of the government and market via managing enterprises and tenants on the creative clusters.

integrating industrial heritage preservation. However, policies supporting private capital (e.g. in 898) in preserving and reusing industrial lands[4] produce a more inclusive paradigm (e.g. on approval/subsidy) to stimulate social and market participation, balancing between heritage protection and economic development. Though reformed state enterprises practice this earlier than their nonstate counterparts, they both become intermediaries between the government, market, and renters like individuals and private firms, adapting industrial heritage renovation to social, economic, and political transformations.

4.3.2. The empirical findings in three case studies in relation to their specific top-down and bottom-up approaches

The early transformation for preserving and reusing industrial buildings in three creative clusters involves both bottom-up and top-down approaches (Fig. 5). Until May 2006, the state enterprise managing the 798 area mainly relied on a bottom-up approach to preserve and reuse the old industrial buildings. Unlike 898 and Laijin, 798 experienced space use transformation without a zoning design project. Artists, designers, entrepreneurs, and tourists all contributed to the space reuse in 798, which is reflected in the diversity of transformation design in the photos of the 798 Art District in Fig. 12 (Photos 4–6). The pursuit of attracting more visitors (by those shops, restaurants, galleries, and art and design studios) also contributed to obtaining "tacit" permission from enterprise managers to renovate the building's interior and exterior. Movrover, the artists, designers, entrepreneurs had the freedom to select economically optimal locations for their studios, galleries, shops, and restaurants, etc., which led to highly mixed land uses inside 798. Prior to 2006, the cooperation between the state enterprises managing 798 and diverse individuals/institutes created a prosperous urban scenery, bringing nationalwide awareness to rediscover the value of old industrial buildings in reviving urban life.

On the other hand, after the State Administration of Cultural Heritage (SACH) of China released the *Notice on Strengthening the Protection of Industrial Heritage in 2007*, both state and nonstate enterprises started employing a more unified transformation design, mostly by star designers, in preserving and renovating old industrial buildings, leading to a dominant tactic of functional zoning plans. For instance, taking Laijin cultural creative industrial park as an example (Photos 2–6 in Fig. 12), its northern border has been developed into commercial service buildings, the inner zones have been transformed into offices, and the office zones have been further categorized into surrounding newly-constructed multistorey buildings for listed companies and central low industrial buildings transformed to host SMEs (Fig. 8). Finally, the old buildings in eastern boundary spaces have also been transformed into commercial services and offices under state enterprise management.

Similarly, a unified transformation design was implemented in 898, including the construction of new multistorey buildings for offices and exhibitions outside the preserved industrial building group, like the inner office zones of Laijin. Fig. 11 indicates that the land use mix in the center zones is lower than that on the borders. According to manager interviews, it was revealed that "the space transformation in Laijin and 898 was assigned to an independent design company to obtain a complete set of transformation plan". Thus, the style of transformed industrial buildings in Laijin and 898 has demonstrated a high degree of unity, distinct from the complex architectural landscape seen in 798.

In contrast to Laijin's simultaneous transformation and operation of Zones A, B, and C (Fig. 8), 898 had to partially commercialize its postindustrial land before renovating postindustrial buildings (Fig. 9). Although Laijin also built new multistorey buildings in zone C-cn (Fig. 8), there were fewer financial constraints that affected the transformation of inner postindustrial buildings. On the other hand, the equity acquisition in 898 for nonstate enterprises suggests a higher investment cost. Thus, the contrasting situation for Laijin highlights the state enterprise's advantage in dominating the original land use right and benefiting from its transaction.

[4] Notice of the General Office of the Beijing Municipal People's Government on Issuing Several Policies on Further Encouraging and Guiding the Investment of Private Capital in Cultural and Creative Industries (No. 52 [2013] of the General Office of the Beijing Municipal People's Government), People's Government of Beijing Municipality.According to this policy, private capital was also encouraged to participate in renovation projects with municipal financial subsidies. In particular, the projects combining innovative high-tech sectors will get a further tax deduction, which could be seen as one motivation for the rise of 898 Innospace. Whether the developers will pursue getting on track by imitating the successful experience of the state enterprise or develop a more independent tactic for achieving diversified sustainability deserves further attention.

Fig. 8. The bird's-eye view photo of Laijin area and the analysis of its land-use zones designed by Kengo Kuma. Photo taken and figure drawn by the author.

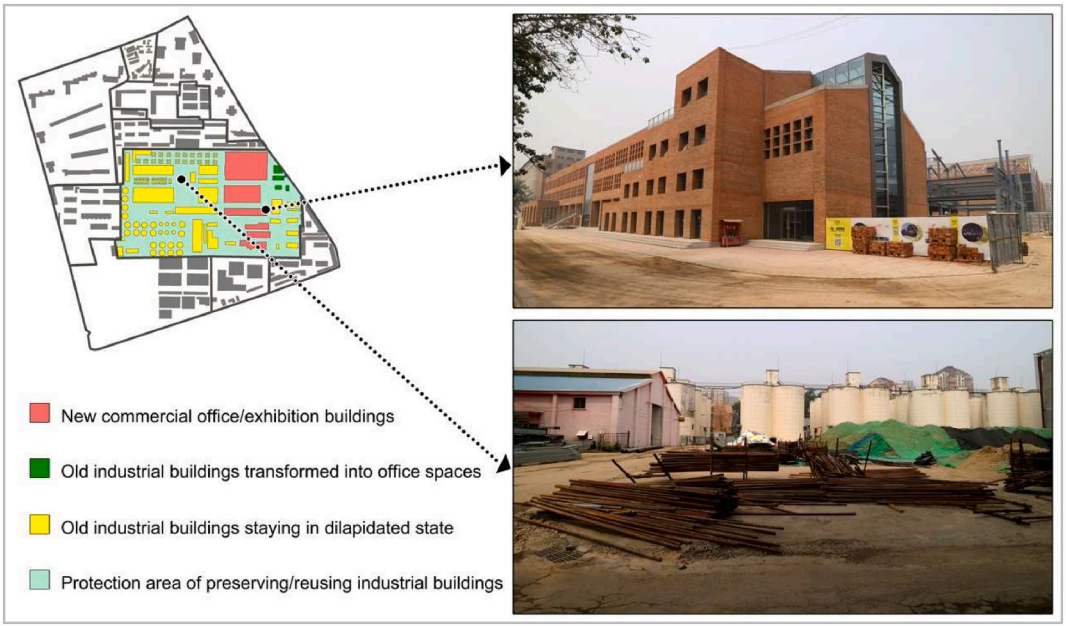


Fig. 9. The earlier construction of new commercial buildings and later transformation of old industrial buildings in 898. Photos taken by the author in 2018. Photo taken and figure drawn by the author.

Table 1
The multilevel transformation of postindustrial land in three enterprises of Beijing before 2020 (Combining Figs. 1, 5 and 6).

	Economic & enterprise reform against recession		The enterprise management during economic recovery		
	Market based activities towards profit pursuing		Market based activities VS State policies to integrate protection and reuse		
	Adjust to surrounding emerging industries	Transfer border lands & raise revenue	Dominant approach to reuse the industrial spaces inside the cluster		Declined border spaces (D) with a Subsequent development (S)
	Bottom-up (BU)	Bottom-up (BU)	Bottom-up (BU)	Top-down (TD)	Bottom-up (BU)/Top-down (TD)
798 & 751 within 798 area (Reformed state enterprises: Seven-star group & Zhengdong group)	Early: Artistic education/ creation institute to the north of 798 Later: High-value-added industries rising in Beijing	Commercial office/ residence buildings	**Yes** (Highly mixed use) Higher freedom to choose and transform building interior and exterior	**Yes** (Zoning plan) 1. Landscape and function planning 2. New office building zones for auto giants	D: Decommissioned buildings S: New/Transformed office buildings for SMEs and IT giants
Laijin Cultural creative Industrial Park (Reformed state enterprise: Jingmian group)	Mass media, business, and art design in the CBD area	Commercial office/ residence buildings	**NA** (Limited function) Mere freedom to transform interior spaces	**Yes** (Zoning design) 1. Service/culture zone 2. Small office zone 3. Large office zone	D: Decommissioned buildings S: Transformed office buildings for service, art, design SMEs
898 Innospace (Nonstate enterprise: 898 IH Co., Ltd.)	Internet/car giants in 798	Commercial office/ residence buildings	**NA** (Limited function) Mere freedom to transform interior spaces	**Yes** (Zoning design) 1. New office/ service 2. Old building zones	D: Shabby border buildings & Empty/abandoned landscapes
Space feature	**Outside cluster—Inside cluster—Fragmented borders**		**Building Interior —Landscape—Whole cluster**		**Fragmented borders**
Gentrification	**Driving force & Economic basis resulting in replacement**		**Industrial synergy & Environmental upgrading**		**Later gentrification**

Within the multilevel transformation, the original land use rights and land transfer revenue occupied by state enterprises (798/ Laijin) enable them to have more initiative and radical capability than private enterprises. Conversely, even though the 898 lacks financial support from land use transfer and is a later player in regenerating postindustrial lands, it has considerably enriched local urban functions and a promising future in creating high urban vitality. In summary, the management experiences of these enterprises, integrating bottom-up and top-down approaches to preserve and reuse old industrial buildings, constitute effective options for revitalizing urban lands.

4.4. The land use as a result of the landscape metrics analysis and land use mix analysis

4.4.1. Morphological: Landscape metrics analysis

Through the landscape metrics analysis in Table 2, we have found significant correlations between SIDI and SHDI, PR and SHDI, PR and SIDI, LPI and SHDI, and LPI and SIDI. This indicates that a dense road system and rich block shapes lead to an increase in land use diversity. In addition, Fig. 10 and Table 2 reveal the advantages of the bottom-up approach in diversifying landscape patches and preserving heritage spaces. Furthermore, nonzoning management is also effective in promoting informal networks by creating more edges between different patches. **First**, in contrast to 898 and Laijin, the plot of 798_B has a higher SHDI and SIDI than that of 798_A/C.

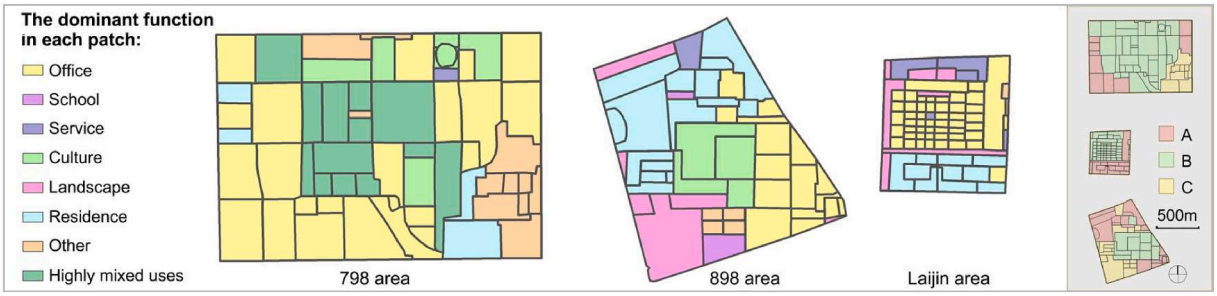


Fig. 10. The landscape patches are dominated by different functions in the areas of 798, 898 and Laijin. A: Plot with transferring/commercializing the land use, B: Plot with preserving & reusing the industrial buildings, C: Plot staying in decline/slow development, Area: Original whole plant area of each enterprise.

Table 2
Results of the landscape metrics analysis of 798, 898 and Laijin areas.

Aspects	Area and Edge metrics				Aggregation metrics	Diversity metrics			
Indicators	Total area	Largest patch index	Total edge	Edge density	Euclidean nearest neighbor	Patch richness	patch richness density	Shannon diversity	Simpson diversity
	(TA)	(LPI)	(TE)	(ED)	(ENN_MN)	(PR)	(PRD)	(SHDI)	(SIDI)
798_area	94.0	34.6	7510.0	79.9	234.8	6.0	6.4	1.3	0.7
798_A	19.6	60.0	380.0	19.4	195.7	2.0	10.2	0.3	0.1
798_B	64.8	34.8	5130.0	79.1	169.9	5.0	7.7	1.1	0.6
798_C	12.4	68.2	550.0	44.3	NA	2.0	16.1	0.6	0.4
898_area	50.3	33.6	4090.0	81.4	228.7	7.0	13.9	1.6	0.8
898_A	18.8	65.4	850.0	45.3	509.6	4.0	21.3	0.9	0.5
898_B	15.9	49.4	580.0	36.5	108.2	3.0	18.9	0.9	0.6
898_C	16.0	37.7	930.0	58.2	63.2	6.0	37.5	1.5	0.7
Laijin_area	21.6	47.7	2980.0	137.7	86.8	5.0	23.1	1.3	0.7
Laijin_A	9.4	56.9	840.0	89.4	60.0	3.0	31.9	0.9	0.6
Laijin_B	11.9	65.1	1420.0	119.8	74.6	3.0	25.3	0.9	0.5
Laijin_C	0.4	56.4	20.0	51.3	NA	3.0	769.2	1.0	0.6

This implies that the highly mixed land use configuration contributes to creating a relatively larger landscape diversity. **Second**, compared to the other two clusters, 798_B has a higher proportion of TA among its whole area, indicating that nonzoning-oriented transformation preserves a large scale of industrial heritage space within a cluster. **Third**, the ED values of plots 798_B and 798_area are higher than that of 798_C, similar to Laijin but opposite to 898. Therefore, the landscapes managed by state enterprises occupy more potential public spaces, promoting the informal networks of the clusters. These phenomena confirm the advantageous influence of state enterprises, compared to nonstate enterprises, in financial support of heritage protection and reuse. **Moreover**, the landscape metrics analysis testifies to the commonalities and differences between enterprises in their land-use features, solidifying the study method of exploring the roles of market entities in urban regeneration. **In conclusion**, the diverse land use patterns also disprove the criticism of duplicate construction of creative clusters, suggesting that more spontaneous selection by enterprises to regenerate their industrial landscapes matters, which has received insufficient attention in previous studies.

4.4.2. Functional: Land use mix analysis

Fig. 11 illustrates the land use mixture within small fishnet grids measuring 80 m by 80 m. The variation in land use, both in terms of main functions and subfunctions, resulting from the nonzoning design has been revealed using various entropy values. The industrial heritage buildings of 798 encompass a significantly larger area with a higher land use mix, indicating the coexistence of

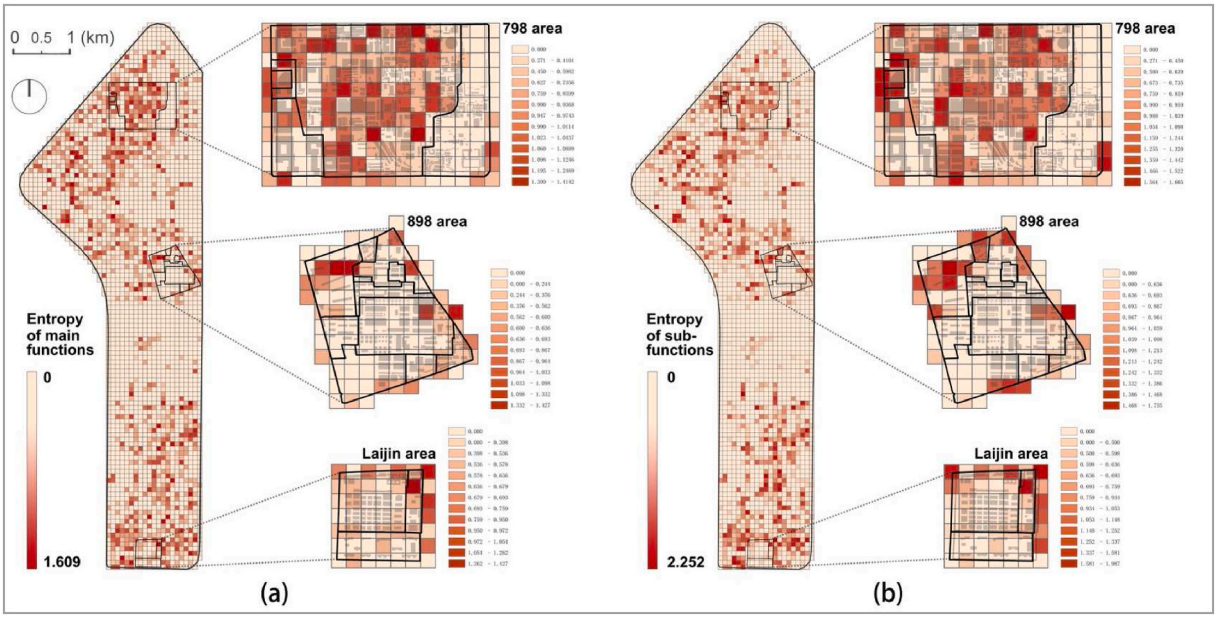


Fig. 11. The land-use mix in terms of main functions (a) and subfunctions (b) based on POI data collected from the open data platform Baidu map in 2018.

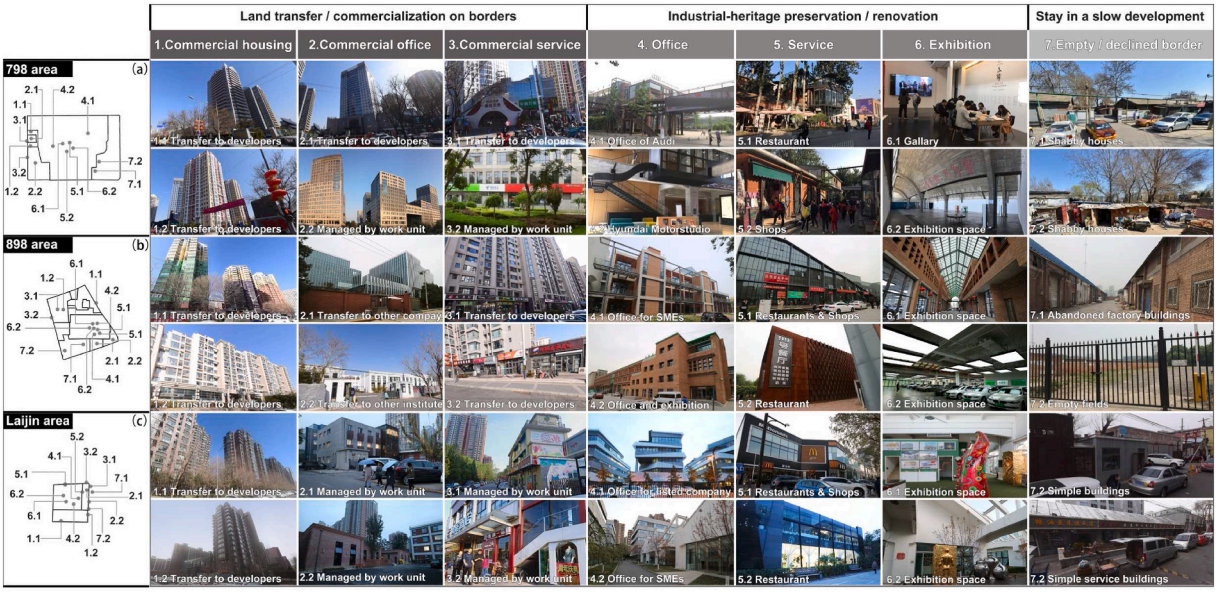


Fig. 12. The record of space use in selected enterprises (a. 798 area, b. 898 area, c. Laijin area). Figure drawn and photos mainly taken by the authors (Some photos are collected from the open map platform Baidu map).

various functions. During the field observation, it was noticed that many buildings in 798 perform multiple functions including exhibition, theatre, retail, restaurant, office, and so on. Therefore, the intricate fusion of work and leisure activities in these buildings promotes the accessibility and interaction between individuals and companies. This is consistent with the impacts highlighted by the analysis of landscape metrics.

Conversely, the zoning design implemented in Laijin results in a clear demarcation between working and service areas (Fig. 8). Larger portions of service functions are located on the northern and eastern borders, while the inner areas are primarily occupied by office buildings. Whether assessed by main functions or subfunctions, the land use mix on the borders is greater than the mix in the internal office zones (Fig. 11). Moreover, the slowly developing border spaces of 898 (Photos 7.1–7.2 depicted in Fig. 12) have lower entropy than the other earlier transformed border spaces. In addition to this, the industrial lands preserved and repurposed in Laijin and 898 are considerably smaller than those in 798. The dense road system in Laijin (Fig. 10 and Table 2) also corresponds to the highest ED in preserved heritage spaces among the three industrial lands, indicating lower problems with low accessibility between areas of varying functions. The above land use features enable top-down management by both state and nonstate enterprises, echoing their aspiration to embrace a unified and zoning design.

4.5. The spatial performance after multilevel transformation of postindustrial land based on a dynamic urban vitality analysis

The actual population densities can, to some extent, reflect how individuals invigorate the land use vitality in different transformed enterprise spaces and the surrounding urban areas (Figs. 13 and 14). **First**, the population densities in fishnet grids generally correlate with the land use mix. Grids with higher entropy values tend to attract a larger number of people during working and leisure time. The population densities in the central grids covering the old industrial buildings in 798 are higher than those in the centers of Laijin and 898, which affirms the highly mixed land uses (established through a more nonzoning-oriented approach) can draw more users and enhance urban vitality. Additionally, many grids in the industrial heritage areas of 798 exhibit greater vitality than those in the other two enterprises during working and leisure times. Specifically, during summer weekends, land use vitality within 798 sustains high levels between 12:00 and 20:00. In contrast, grids within industrial preservation zones for offices in Laijin do not report very high densities. Significantly, many grids within Laijin remain deserted with few people at 10:00 on weekends, which is expected due to its relatively homogeneous office function. Due to the ongoing transformation project within 898, most grids covering industrial buildings remain unoccupied during most periods of the day. In summary, bottom-up oriented mixed land use holds an advantage over top-down oriented zoning design in continuously promoting space use vitality from weekdays to weekends as well as from day to night.

Second, according to the analysis of population densities in different areas both within and outside the enterprises (Fig. 14), the transformation in Laijin and 798 revitalized urban life differently. Comparing the population densities of transformed industrial heritage zones in Laijin (Laijin_IH) on the 16th of January, the population density between 10:00 and 18:00 is much higher than in any other area. This suggests that while Laijin does not possess grids with exceptionally high levels of vitality like 798 has, the working population with high density has been more evenly distributed in Laijin. To some extent, the zoning design plays a crucial role in rebalancing the distribution of incoming white-collar workers owing to "*its unified transformation plan and design*". On the other hand, 798 still exhibits greater population densities than the surrounding urban environments, even during weekdays. Additionally, the

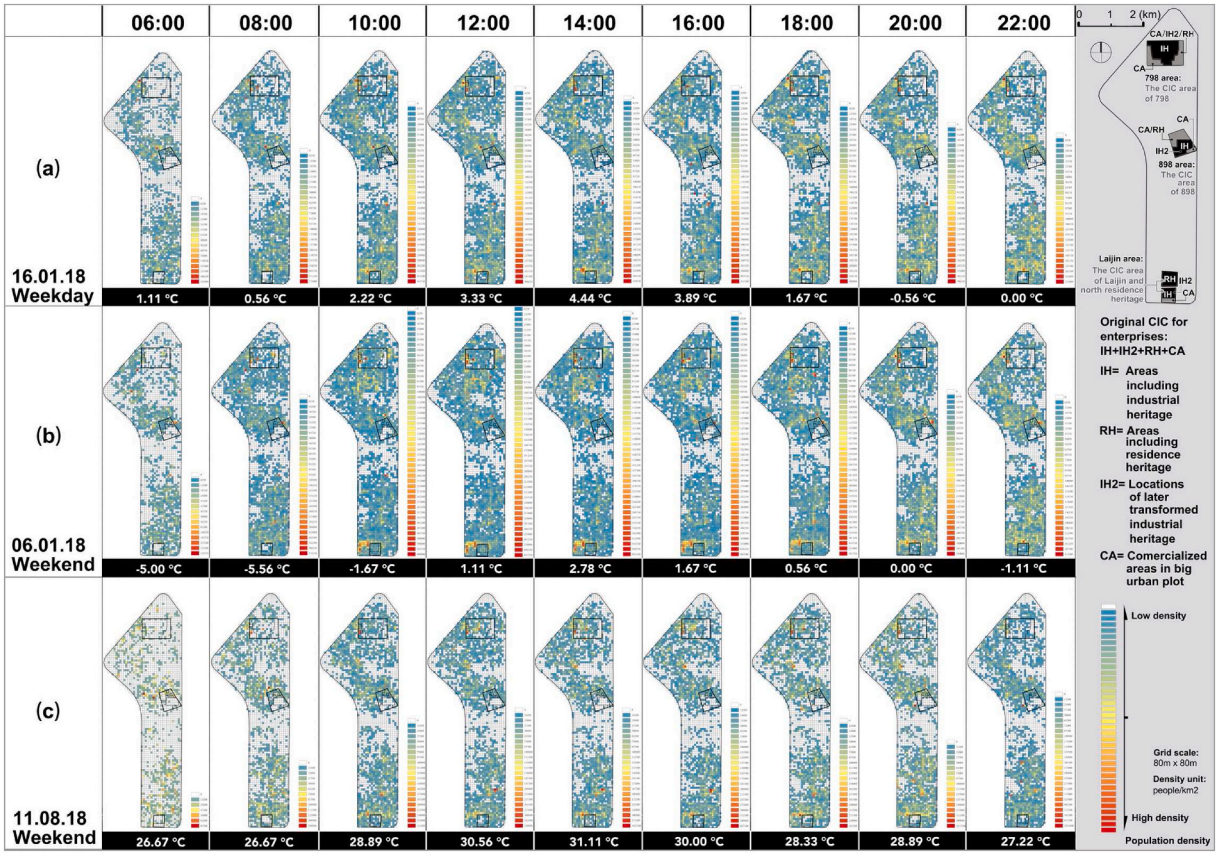


Fig. 13. The population density in fishnet grids (Grid scale:80 m × 80 m, Density unit: people per square kilometer).

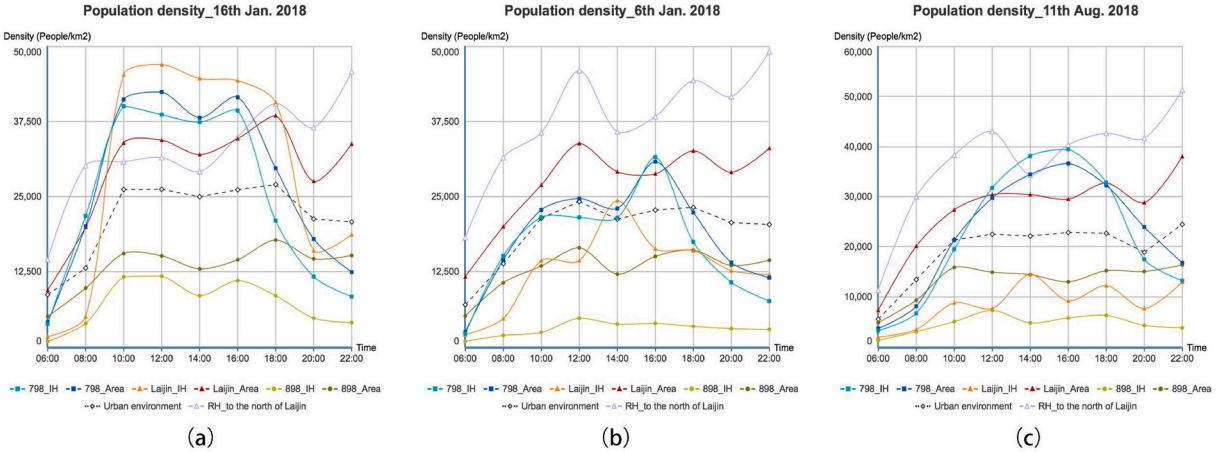


Fig. 14. The real-time population densities of different areas in and surrounding the selected enterprises. Figure adapted from Ref. [85] and has been permitted by the author to be utilized in this article.

population densities around 14:00 on 16th January and 11th August (weekends) inside 798 were higher than in other enterprise areas, which affirms its strong appeal for leisure activities.

Third, this research integrates the field study, depth interview, and analysis of dynamic land-use configuration and urban vitality to unveil the role of (non)state enterprises in regenerating postindustrial lands. Specifically, the examination of real-time and inferred population densities reveals space use vitality from a more holistic and precise perspective. While the population density in fishnets generally correlates with the land use mix, we cannot evaluate actual urban vitality merely by examining POI-based mixed land uses.

For instance, in the 798 area, the vitality of the private commercial office and residential areas in the northwest, managed by developers with a relatively larger mix of land use (combining 1.1/1.2/2.1/3.1 in Fig. 12), is lower than that in the commercial office spaces in southwest controlled by state enterprise (combining 2.2/3.2 in Fig. 12). A similar finding also exists in the Laijin area. Comparing real-time population densities at multiple scales (small fishnet grids, industrial heritage areas, 798/898/Laijin enterprise work units, and the whole area) more comprehensively reveals the dynamic population distribution. Such variation across different hours, days, and seasons at different local scales highlights the limitations of urban vitality analysis mainly conducted by examining land use mix based on static POIs data. The methodological advancement helps to avoid the either/or discussion on the influences of bottom-up and top-down approaches to urban vitality and reveals the differences in improvements of urban vitality by both approaches. On the other hand, whereas there is doubt that creative clusters might suffer from duplicate construction (Keane 2009), our study presents three creative clusters demonstration diverse performances in terms of industrial configuration, landscape scenery and urban vitality.

5. Discussions and conclusion

5.1. Discussions

The aim of this paper is to contribute to the wider debate on the theory, methodology, and policy of regenerating postindustrial lands. One of the key contributions of this paper is a theoretical discussion. The trend of bottom-up and top-down development is always influenced by dynamic economic situations. A deteriorating economy and less political control create an environment that favors the bottom-up approach, which needs to balance with the increasing top-down influences in the later economic recovery. While the organic approach nourishes a hybrid with other forms of Dutch urban development during the economic recession in 2008 [86], it is not a panacea for densification, but rather a challenge to the safeguarded environmental norms [87]. In China, market and enterprise reforms to confront the economic crisis grant greater independence to various participants to boost urban renewal with less pre-planned intervention.

Besides, some enterprises contribute to creating a buffer context to alleviate the tension between state legislative influence and flexible individual initiatives, producing room for urban renewal experiments towards higher density and diversity. Even in government-led cultural district projects in Korea, indirect support from the government rather than direct intervention contributes to the cultivation of a creative milieu without being profit-driven [88]. **In contrast,** several creative clusters in Beijing are attempting to eliminate the gap between creative/innovative cultural and economic purposes, suggesting an attempt to balance more complex pursuits from diverse parties. Specifically, this study reveals the role of particular market entities (i.e. state and nonstate enterprises) in both top-down and bottom-up approaches to preserving and reusing postindustrial land, suggesting a less dichotomous perspective. **Moreover**, further exploration of enterprises' initiative and linkage in cultivating creative cultural clusters enriches our knowledge of transforming postindustrial land to alleviate conflicts between organic and policy-led influences, in addition to the framework integrating the state, market, and community [69].

On the other hand, in addition to highlighting the participatory planning in regenerating residential spaces [64,65,89], **exploring the multilevel transformation mechanism helps to further understand the trend of relying increasingly on enterprises' participation in revitalizing large-scale declined industrial spaces.** Specifically, the role of enterprises as an intermediate joint between different parties in transforming postindustrial lands is similar to that of community planners in residential lands mentioned by Zhou et al. [89]. **Therefore**, our study also disapproves the notion that top-down and bottom-up influences are static and incompatible [53].

The second theoretical contribution lies in the revelation of diverse performances in industrial land use transformation arising from differential competition and localized industrial synergy. This contrasts with the duplicative and monotonous phenomenon in urban renewal resulting from policy-led intervention and gentrification [15,18,27,37,38] **Moreover, despite criticism by Gainza** that cultural policies lead to gentrification while not promoting socio-economic prosperity [21], our research evidences the significant role of (non)state enterprises in combining local initiatives and policy support for revitalizing postindustrial spaces. **This clarifies an alternative mechanism of urban regeneration rooted in spontaneous market actions and subsequent exploratory policy-making, thus reversing the deficiency of gentrification in generating urban vitality.**

In addition, echoing the debates on cultural consumption and production [19,26,40,41,90], **this study acknowledges that the development of postindustrial land benefits from both the above actions, reflecting the complex interactions and pursuits among enterprises, individuals, state and market**. Nonetheless, Sasaki indicates vertical, bureaucratic, and organizational management harasses the construction of creative cities with balanced cultural consumption and production [91]. Moreover, Chou criticiszs state intervention leading to the replacement of an organic network of artists with commercial networks in cultural promotion and consumption [38]. **However**, the inevitable trend of gentrifying the neighborhood is first triggered by artists and then by more affluent newcomers, and so forth [92] (Table 1). **In addition**, we emphasize the spontaneous market forces at play in gentrification as part of the process of upgrading cultural production and consumption, which also promotes local economic viability by creating more professional jobs in rising innovative industries. **Although** some scholars criticize that the top-down approach neglects the demand of grassroots in cultural consumption and production [15,19], we have to ask why the higher urban vitality can be detected in three selected creative cultural clusters with the top-down approaches involved. Is there another neglected panacea for promoting local prosperity? Our response is rooted in the breakthrough of a dualistic perspective, which encompasses both the top-down/bottom-up approaches and cultural consumption/production, within the domain of urban regeneration. This underscores the importance of independent enterprise initiatives in strengthening the active tactics within the present participatory planning for urban revitalization.

A methodological contribution of this study is to reveal the pros and cons of top-down and bottom-up approaches in reversing the lack of urban vitality. Previous research has mainly associated vitality with the diversified reuse of dilapidated urban spaces [65,75,79,93]. However, they have paid relatively little attention to the intensity of space revitalization through different approaches, and the resulting paradigm. In contrast, this study testifies to the strength of the top-down oriented zoning plan for service and office in scattering the high-density workforce. Such an approach contrasts with the highly mixed and organic space uses, which results in a lasting vitality spanning office and leisure times. Additionally, this progress aligns with Michael Batty's expectation of testing new theories with new data sets [57]. Moreover, Instead of assessing the transformation under the top-down influence based solely on static land use mix [8], our analysis integrates multiple methods including landscape morphology, land use mix, and dynamic multi-scale vitality to measure and compare the spatial performance driven by various transformation approaches. In particular, we calculate the de facto population of dynamically stimulating the space use to avoid data bias, which occurs due to the limited number of service app users [94,95] and the differing features between several types of data [79].

Our study **re-evaluates the previous criticism of state policies** aimed at cultivating creative and innovative clusters to regenerate the brownfield. This study emphasizes the value of moderate policy-making that promotes enterprise initiatives in participatory planning mechanisms. The study encapsulates three policy implications: **First**, it is essential to balance the role of the bottom-up approach in weathering economic depression with the enthusiasm for applying the top-down approach in economic recovery. In particular, policy-making should stimulate enterprise initiatives by accommodating bottom-up creativity and providing indirect fiscal support from the top-down in urban regeneration. **Second**, urban vitality is a crucial attribute to evaluate the performance of land use transformation, and policymakers should integrate vitality assessment into the policy-making process. **Lastly**, the gentrification phenomenon should be re-evaluated based on diversified land use performances, requiring more objective methods and proper policy reactions.

The subsidy conditions set in policy to request an occupancy rate of at least 70% and limiting FAR below 1 aim at balancing the local economic revitalization and industrial heritage protection while having minimal intervention in the subsequent diversified land use transformation. **Moreover, this study emphasizes the value of the exploratory feature of policy-making, which always follows the market entities' spontaneous achievements and cooperates with their various attempts to transform and reuse postindustrial lands**. For instance, unlike policy-led pre-planning [19], the diversified performances of three cases in our study did not derive from expectations, whether bottom-up or top-down approaches were adopted, but from the processes of spontaneous adaptation to market competition by seizing different transformation opportunities and taking advantage of respective locations. This is also driven by exploratory socio-economic reform. Therefore, the successful experience of 798 cannot not be imitated by the other areas in the same way due to fewer business opportunities for later players. For example, the transformation within the 798 area happened much earlier than Laijin. Due to its larger mixed-use territory, the 798 provided richer affordable spaces that attracted professors in a nearby art academy and other artists. However, when Laijin initiated its own project, the increasing rent in 798 made it impossible for artists to afford, forcing them to seek new locations far away from the urban center. In contrast, Laijin was closer to the urban center and other rising high value-added industries (e.g. media and TV, etc.). The unified transformation project in Laijin reduced the construction and operating cycle, contributing to absorbing and serving related SMEs and listed companies more professionally. Therefore, instead of being influenced by successful pioneers, the greater potential for urban vitality is inextricably linked to what is happening elsewhere.

5.2. Conclusion

(Non)state enterprises play a crucial role in regenerating postindustrial land by transitioning their intermediate roles between bottom-up and top-down oriented approaches. This surpasses the original dualistic debates of policy-led and organic processes. Additionally, a comparison of the general intermediate roles of (non)state enterprises in the multilevel transformation mechanism reflects the commonalities and differences among the selected enterprises in their ability to survive and revitalize declined industrial lands (Fig. 6). The multilevel transformation of decommissioned industrial land by selected (non)state enterprises is a complex combination of interrelated processes, including adapting to emerging urban industries, transferring boundary land uses, and preserving/reusing industrial buildings (Table 1).

Examining the role of enterprises managing industrial lands in reversing the lack of urban vitality also broadens our horizon in addressing the economic downturn. Although declining state enterprises have advantages in transferring and self-controlling land use rights, they must compete and be accountable as independent market entities like other nonstate enterprises. Without the support of a command economy, neither state nor nonstate enterprises could afford to maintain or transform the large-scale industrial lands in the urban center, leading to the fragmentation of their boundary spaces and a gradual regeneration that enriches the urban fabrics and land use mix by absorbing the contributions of diversified participants. Although the economic recession weakened political control, it also granted more freedom to enterprises in business exploration, particularly for struggling state enterprises. This phenomenon was also evident in cities such as Shanghai and Guangzhou during the economic reforms, indicating the significance of (non)state enterprises' initiatives in urban regeneration. Limited policy intervention was evident in their business decisions, with predominant financial support instead being provided for leveraging the heritage values.

Enterprises employ bottom-up and top-down approaches in regenerating declined industrial land with different performances at any common phase of the multilevel transformation. Although all three selected postindustrial lands follow a similar spatio-temporal sequence to experience differentiated and fragmented land-use states, the preservation and reuse of the postindustrial spaces manifest in different manners: nonzoning (no planned) and zoning (planned) designs. The advantages of nonzoning and zoning design in urban regeneration differ in terms of density management. Nonzoning design ensures

sustained vibrancy throughout the week, making the area more attractive to diverse demographics. **On the other hand**, zoning design creates a dense population that is evenly distributed, leading to heightened vitality during the weekdays which is particularly beneficial for the industrial synergy. **Furthermore**, certain enterprises have the capability to preserve and repurpose declining postindustrial spaces through an inclusive approach that combines nonzoning and zoning designs as seen in the 798, or through a radical approach that involves unified protection and construction, similar to what is observed in Laijin. As opposed to organic development, the policy-led approach, which emphasizes the occupancy rate, is also crucial in cultivating a "critical mass" of creative industries within creative clusters. For this reason, enterprises effectively incorporate a top-down planning strategy alongside the original bottom-up approach during later stages of redevelopment.

In addition, our findings demonstrate an increasing tendency towards top-down influence, which is also observed in other countries' cultural development or regeneration practices. Similar to 798, the Kabin project shifts from bottom-up to top-down approaches in its growing process, indicating a decrease in tenant participation/significance in organizational interactions [96]. Moreover, Jeong and Patterson suggest the superiority of the "top-down" approach over "bottom-up" in establishing a stronger urban physical interrelation (by linking with diversified travel modes) in American cities [97]. This is analogous to the tactic employed by Laijin to construct the turning-outward service border for promoting urban integration and pursuing a higher return on investment. Lastly, scholars confirm that the top-down approach is strategically important in encouraging participants in bottom-up practices (local civic networks) to develop their distinct locality through free practice [98–100]. The resemblance in the significant role of the top-down approach in cultural area development between China and abroad may be linked to the market competition homogenized by a globalized mechanism of commercial exploitation. In particular, the increasingly marketized collaborative practices among governments and entrepreneurs are more easily led by a top-down-oriented public/commercial plan, which aims for high implementation efficiency and generates the prior expectation of a long-term return. Nevertheless, enterprises' initiatives in combining bottom-up and top-down approaches still contribute to alleviating the hindrance to revitalizing postindustrial spaces.

Moreover, the integration of high-value-added and high-tech industries also nourishes the cultural renewal in creative clusters, facilitating the upgrade of local infrastructures and benefiting neighborhood residents. In addition, endogenous factors, such as historical accumulation, the on-site synergy of firms and their financial competitiveness, and the density of labor force and visitors, also contribute to varying levels of vitality in creative clusters. Finally, enterprises must adhere to market rationality to survive in the competition. This is a condition for enterprises to serve as an intermediate joint in urban revitalization and highlights the importance of multilevel transformation and gradual land use differentiation.

Therefore, the urban regeneration process is characterized by dynamic and, at times, precarious changes, emphasizing the necessity for developing a comprehensive analysis scheme and dynamic evaluation method to examine the land use transformation and performance. The analysis of multilevel transformation, gradual land use differentiation, and the intermediate role of enterprises form a general framework for exploring the revitalization of postindustrial lands. Combined with the examination of specific morphological and functional factors (land-use metrics and entropy index), observation and speculation of dynamic population densities facilitate the evaluation of urban vitality and contribute to revealing actual performances of the urban regeneration process. **While** static land use analysis only presents space use opportunities, vitality analysis based on real-time, multi-scalar population densities is more effective in assessing the actual performances of different transformation tactics in urban regeneration planning. Furthermore, it contributes to evaluating planning and management issues in urban regeneration, which rely heavily on examining people's involvement in the current urban space. Comparing the three enterprises with various transformation approaches, the results disprove the notion that the bottom-up approach is superior to the top-down path in stimulating the urban space uses. Instead, while the bottom-up approach encourages peoples' use of space by providing a higher level of land use mix, the top-down path also contributes to space use vitality by activating space evenly through the balanced distribution of a dense working population. A combination of these two approaches could foster the effective social and spatial transformation of former industrial lands.

Based on the findings and results of this article, it is crucial to make further efforts to incentivize enterprises' spontaneous attempts in preserving and reusing the heritage spaces with minimal pre-planned intervention, especially without restrictions on their inner experiments utilizing top-down and bottom-up approaches. Additionally, both public and private sector enterprises should receive equal policy support **and subsidies, as well as more freedom in choosing their business operations. Therefore, it is recommended that a more exploratory and moderate policy-making process be adopted to foster an external environment that offers opportunities for enterprises to reform towards economic prosperity and urban vitality**. There are also limitations in this article. Given that industrial heritage sites are highly complex structures and represent an essential part of our social, spatial, cultural, and technological past, an interdisciplinary approach is required to research and evaluate its transformation. Thus, further information on associated economic, cultural, and social benefits is necessary to better interpret the relationship between land transformation/redevelopment and spatial performance. Even though we can deduce the general difference in space users between 798 and Laijin from the analysis of the historical transformation of land uses, we have not examined the more precise structure of the flowing population in selected urban areas. Specifically, our methods have not differentiated the individuals employed in the creative industry from others involved in the consumption brought by gentrification. Efforts, including questionnaires, census and related big data analysis, would be promising to reveal the gender, age, rent, income, profession, etc., of a large number of participants and their undiscovered roles in revitalizing the urban space use. Moreover, considering the high population density in urban Beijing, we define places occupied by higher densities more vitalized, suggesting that the definition of space use vitality in our research is a relative concept embedded in specific socio-spatial contexts. Particularly, integrating the big data analysis, such as the perception of urban emotions [101], will also contribute to differentiating the positive urban vitality from negative overcrowding. Thus, more empirical comparison integrating the examination of the real-time density of flowing population in different

regions and countries would be necessary for a more comprehensive understanding of urban vitality.

Funding statement

This work is supported by the General Project of MOE Foundation for Humanities and Social Sciences, Youth Project (Project Number: 23YJCZH058) and the Fujian Provincial Social Science Foundation, Key Project (Project Number: FJ2023A014).

Data availability statement

Data included in article/supp. Material/referenced the in article.

Ethical Statement

Hereby, I/Gu, Yan/consciously assure that for the manuscript/Examining the transformation of postindustrial land in reversing the lack of urban vitality: A paradigm spanning top-down and bottom-up approaches in urban planning studies/the following is fulfilled.

1) This material is the authors' own original work, which has not been previously published elsewhere.
2) The paper is not currently being considered for publication elsewhere.
3) The paper reflects the authors' own research and analysis in a truthful and complete manner.
4) The paper properly credits the meaningful contributions of co-authors and co-researchers.
5) The results are appropriately placed in the context of prior and existing research.
6) All sources used are properly disclosed (correct citation). Literally copying of text must be indicated as such by using quotation marks and giving proper reference.
7) All authors have been personally and actively involved in substantial work leading to the paper, and will take public responsibility for its content.

The violation of the Ethical Statement rules may result in severe consequences.

To verify originality, your article may be checked by the originality detection software iThenticate. See also http://www.elsevier.com/editors/plagdetect.

I agree with the above statements and declare that this submission follows the policies of Solid State Ionics as outlined in the Guide for Authors and in the Ethical Statement.

CRediT authorship contribution statement

Yan GU: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper. **Yanju YAO, Wei YAN, Juanjuan ZHAO, Teng FEI, Shulin OUYANG:** Contributed reagents, materials, Analysis tools or data; Designed the experiments, Analyzed the data; Wrote the paper.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] H. Mommaas, Cultural clusters and the post-industrial city: towards the remapping of urban cultural policy, Urban Stud. 41 (3) (2004) 507–532.
[2] N. Gureshidze, Cultural policies of creative clusters: a short review, J. Soc. Sci. 5 (1) (2016) 13–17.
[3] J. Hawkes, Common ground, The fourth pillar of sustainability: Culture's essential role in public planning (2001).
[4] L. Loures, T. Panagopoulos, Recovering derelict industrial landscapes in Portugal: past interventions and future perspectives, in: Proceedings of the Int. Conf. On Energy, Environment, Ecosystems & Sustainable Development, 2007 (Citeseer).
[5] Y. Huang, Urban Development in Contemporary China. China's Geography: Globalization the Dynamics of Political, Economic Social Change, Roman Littlefield Publishers, Boulder, 2006, pp. 233–262.
[6] F. Wu, Rediscovering the 'gate'under market transition: from work-unit compounds to commodity housing enclaves, Hous. Stud. 20 (2) (2005) 235–254.
[7] D. Bray, Social Space and Governance in Urban China: the Danwei System from Origins to Reform, Stanford University Press, 2005.
[8] Y. Yin, et al., *The 798 Art District: multi-scalar drivers of land use succession and industrial restructuring in Beijing.* Habitat international 46 (2015) 147–155.
[9] J. Morris, J. Sheehan, J. Hassard, From dependency to defiance? Work-unit relationships in China's state enterprise reforms, J. Manag. Stud. 38 (5) (2001) 697–717.
[10] G.H. Jefferson, T.G. Rawski, Enterprise reform in Chinese industry. Journal of Economic Perspectives 8 (2) (1994) 47–70.
[11] C. Zhang, Y. Chai, L. Chen, The evolution from Danwei community to citizen community: case study of Tongrentang in Beijing, Urban Planning International 24 (5) (2009) 33–36.
[12] C. Zhang, Y. Chai, Un-gated and integrated work unit communities in post-socialist urban China: a case study from Beijing, Habitat Int. 43 (2014) 79–89.
[13] F. Zhang, Research on the Evolution, Problem and Countermeasure of the Unit Compound in Transformation Period: Typical Cases in Beijing, in *School of Architecture*, Southeast University, Nanjing, 2004.
[14] Y. Li, et al., From project to policy: adaptive reuse and urban industrial land restructuring in Guangzhou City, China, Cities 82 (2018) 68–76.
[15] J. Zheng, R. Chan, The impact of 'creative industry clusters' on cultural and creative industry development in Shanghai. City, Culture Society 5 (1) (2014) 9–22.

[16] S.B. Goldberg-Miller, Y. Xiao, Arts entrepreneurship and cultural policy innovation in Beijing, Artivate 7 (1) (2018) 23–47.
[17] B.D. Drinkwater, S. Platt, Urban development process and creative clustering: the film industry in Soho and Beyoğlu, Urban Des. Int. 21 (2) (2016) 151–174.
[18] S. Arbaci, T. Tapada-Berteli, Social inequality and urban regeneration in Barcelona city centre: reconsidering success. European Urban and Regional Studies 19 (3) (2012) 287–311.
[19] S. He, J. Wang, State-led Creative/cultural City Making and its Contestations in East Asia: A Multi-Scalar Analysis of the Entrepreneurial State and the Creative Class, Elsevier, 2019, pp. 305–309.
[20] C. Morgner, The morphogenesis of art districts: case studies of Williamsburg, NYC and 798, Beijing. Belgeo, Rev. Belg. Geograph. (3) (2014).
[21] X. Gainza, Culture-led neighbourhood transformations beyond the revitalisation/gentrification dichotomy, Urban Stud. 54 (4) (2017) 953–970.
[22] C. Hamnett, Advanced Introduction to Gentrification, Edward Elgar Publishing, 2021.
[23] Matthias. Bernt. *The commodification gap: gentrification and public policy in London, Berlin and St*, John Wiley & Sons, Petersburg, 2022.
[24] R. Florida, Basic books New York, The rise of the creative class 9 (2002).
[25] R.L. Florida, Cities and the Creative Class, Psychology Press, 2005.
[26] J. Peck, Struggling with the creative class. International journal of urban and regional research 29 (4) (2005) 740–770.
[27] A.C. Pratt, *Creative cities: the cultural industries and the creative class.* Geografiska annaler: series B, Hum. Geogr. 90 (2) (2008) 107–117.
[28] L. Li, De-industrialization and development of industrial heritage tourism: the actual process and development model of Ruhr in Germany [J], World Regional Studies (2002) 3.
[29] G.-J. Hospers, Industrial heritage tourism and regional restructuring in the European Union, Eur. Plann. Stud. 10 (3) (2002) 397–404.
[30] L. Loures, T. Panagopoulos, Sustainable reclamation of industrial areas in urban landscapes, Sustainable Development Planning Iii 102 (2007) 791–800. Vols 1.
[31] L. Loures, et al., Multifunctional clusters in Post-industrial Landscapes: rising from what's left, Sustain. Dev. 21 (2008) 24.
[32] P. Ozden, Culture-led regeneration projects in post-industrial areas: the Istanbul experience, WIT Trans. Ecol. Environ. 155 (2012) 823–834.
[33] L. Loures, Post-industrial landscapes as drivers for urban redevelopment: public versus expert perspectives towards the benefits and barriers of the reuse of post-industrial sites in urban areas, Habitat Int. 45 (2015) 72–81.
[34] C. Merciu, et al., Culture-led urban regeneration as a catalyst for the revitalisation of the Romanian industrial heritage, ISR-Forschungsbericht 42 (2017) 403–418.
[35] M. Cho, S. Shin, *Conservation or economization? Industrial heritage conservation in Incheon, Korea.* Habitat international 41 (2014) 69–76.
[36] J.S. Eom, D.W. An, Regeneration of industrial facilities into cultural facilities in Seoul: studying location value, Sustainability 10 (12) (2018) 4778.
[37] M. Keane, The capital complex: Beijing's new creative clusters, in: Creative Economies, Springer, 2009, pp. 77–95. Creative Cities.
[38] T.-L. Chou, *Creative space, cultural industry clusters, and participation of the state in Beijing.* Eurasian geography economics 53 (2) (2012) 197–215.
[39] M. Keane, *China's New Creative Clusters: Governance, Human Capital and Investment.* China's New Creative Clusters: Governance, Human Capital and Investment, Taylor and Francis, 2013, pp. 1–204.
[40] J. Zheng, R. Chan, *A property-led approach to cluster development:'creative industry clusters' and creative industry networks in Shanghai.* Town Planning Review 84 (5) (2013) 605–633.
[41] S. Zukin, Loft living as 'historic compromise'in the urban core: the New York experience. International Journal of Urban Regional Research 6 (2) (1982) 256–267.
[42] A.C. Pratt, *Urban regeneration: From the artsfeel good'factor to the cultural economy: a case study of Hoxton, London.* Urban studies 46 (5–6) (2009) 1041–1061.
[43] J. Currier, Art and power in the new China: an exploration of Beijing's 798 district and its implications for contemporary urbanism, Town Plan. Rev. 79 (2–3) (2008) 237–265.
[44] Chen, Jie, Bruce Judd, and Scott Hawken. "Adaptive reuse of industrial heritage for cultural purposes in Beijing, Shanghai and Chongqing." *Structural Survey* 34, no. 4/5 (2016): 331-350.
[45] M. Berta, M. Bottero, V. Ferretti, *A mixed methods approach for the integration of urban design and economic evaluation: Industrial heritage and urban regeneration in China.* Environment and Planning B-Urban Analytics and City Science 45 (2) (2018) 208–232.
[46] L. Kong, *Making sustainable creative/cultural space in Shanghai and Singapore.* Geographical Review 99 (1) (2009) 1–22.
[47] P.A. Sabatier, Top-down and bottom-up approaches to implementation research: a critical analysis and suggested synthesis, J. Publ. Pol. 6 (1) (1986) 21–48.
[48] T.C. Chang, et al., *Urban heritage tourism: The global-local nexus.* Annals of tourism research 23 (2) (1996) 284–305.
[49] C. Steinle, H. Schiele, K. Mietzner, Merging a firm-centred and a regional policy perspective for the assessment of regional clusters: concept and application of a "dual" approach to a medical technology cluster, Eur. Plann. Stud. 15 (2) (2007) 235–251.
[50] I. Pissourios, Top-down and bottom-up urban and regional planning: towards a framework for the use of planning standards. European Spatial Research Policy 21 (1) (2014) 83–99.
[51] M.B. Ingstrup, When firms take the lead in facilitating clusters, Eur. Plann. Stud. 22 (9) (2014) 1902–1918.
[52] M. Grabkowska, Between gentrification and reurbanisation: the participatory dimension of bottom-up regeneration in Gdańsk, Poland, Geografie 120 (2) (2015) 210–225.
[53] N.R. Smith, *Beyond top-down/bottom-up: Village transformation on China's urban edge.* Cities 41 (2014) 209–220.
[54] B. Plevoets, J. Sowińska-Heim, Community initiatives as a catalyst for regeneration of heritage sites: vernacular transformation and its influence on the formal adaptive reuse practice, Cities 78 (2018) 128–139.
[55] W. Issarathumnoon, The Machizukuri bottom-up approach to conservation of historic communities: lessons for Thailand, Power, Purpose, Process, and Practice in Asia (2003) 87.
[56] A.B. Raines, *Change through (industrial) culture : conservation and renewal in the Ruhrgebiet.* Planning Perspectives 26 (2) (2011) 183–207.
[57] M. Batty, Building a science of cities, Cities 29 (2012) S9–S16.
[58] N. Dias, et al., Critical success factors of a bottom up urban design process to deliver sustainable urban designs. International Journal of Strategic Property Management 22 (4) (2018) 265–277.
[59] U.-S. Seo, *Urban regeneration governance, community organizing, and artists' commitment: a case study of Seongbuk-dong in Seoul.* City, Culture and Society 21 (2020) 100328.
[60] D. Tong, et al., Spatially varying relationships between land ownership and land development at the urban fringe: a case study of Shenzhen, China, Cities 105 (2020) 102238.
[61] Y. Li, X. Zhong, *'For the People'Without 'by the people': People and Plans in Shanghai's Waterfront development.* International journal of urban and regional research 45 (5) (2021) 835–847.
[62] P. Naess, Urban planning and sustainable development, Eur. Plann. Stud. 9 (4) (2001) 503–524.
[63] R. Amdam, Empowerment planning in regional development, Eur. Plann. Stud. 18 (11) (2010) 1805–1819.
[64] X. Li, et al., Collaborative workshop and community participation: a new approach to urban regeneration in China, Cities 102 (2020) 102743.
[65] E. Hui, C. m, et al., Urban community regeneration and community vitality revitalization through participatory planning in China, Cities 110 (2021) 103072.
[66] T. Semeraro, et al., *A bottom-up and top-down participatory approach to planning and designing local urban development: Evidence from an urban university center.* Land 9 (4) (2020) 98.
[67] H. Kong, et al., Paths to mixed-use development: a case study of Southern Changping in Beijing, China, Cities 44 (2015) 94–103.
[68] M. Elbakidze, et al., Is spatial planning a collaborative learning process? A case study from a rural–urban gradient in Sweden, Land Use Pol. 48 (2015) 270–285.
[69] J. Mens, et al., *A Typology of Social Entrepreneurs in Bottom-Up Urban Development.* Cities, vol. 110, 2021, p. 103066.
[70] J. Jacobs, The Death and Life of Great American Cities, Vintage Books, New York, 1961.
[71] C. Landry, Urban vitality: a new source of urban competitiveness, Archis (12) (2000) 8–13.

[72] De Koe, D. M., and P. D. B. HvA. "Urban vitality through a mix of land-uses and functions: An addition to citymaker." *Minor Thesis, Wageningen University and Research Centre, Wageningen, The Netherlands* (2013).
[73] J. Montgomery, Making a city: Urbanity, vitality and urban design, J. Urban Des. 3 (1) (1998) 93–116.
[74] E. Sternberg, An integrative theory of urban design. Journal of the American Planning Association 66 (3) (2000) 265–278.
[75] A. Rowley, *Mixed-use development: ambiguous concept, simplistic analysis and wishful thinking?* Planning Practice & Research in Sociology of education 11 (1) (1996) 85–98.
[76] C. Zeng, et al., Spatially explicit assessment on urban vitality: case studies in Chicago and Wuhan, Sustain. Cities Soc. 40 (2018) 296–306.
[77] Y. Long, C. Huang, Does block size matter? The impact of urban design on economic vitality for Chinese cities, Environ. Plan. B Urban Anal. City Sci. 46 (3) (2019) 406–422.
[78] X. Jin, et al., *Evaluating cities' vitality and identifying ghost cities in China with emerging geographical data.* Cities 63 (2017) 98–109.
[79] C. Xia, A.G.-O. Yeh, A. Zhang, Analyzing spatial relationships between urban land use intensity and urban vitality at street block level: a case study of five Chinese megacities, Landsc. Urban Plann. 193 (2020) 103669.
[80] J. Wu, et al., Urban form breeds neighborhood vibrancy: a case study using a GPS-based activity survey in suburban Beijing, Cities 74 (2018) 100–108.
[81] Y. Meng, H. Xing, Exploring the relationship between landscape characteristics and urban vibrancy: a case study using morphology and review data, Cities 95 (2019) 102389.
[82] Anqi Zhang, Weifeng Li, Jiayu Wu, Jian Lin, Jianqun Chu, Xia Chang, How can the urban landscape affect urban vitality at the street block level? A case study of 15 metropolises in China, Environment and Planning B: Urban Analytics and City Science 48 (5) (2021) 1245–1262.
[83] M. Li, et al., Application of spatial and temporal entropy based on multivariate data for measuring the degree of urban function mix, China City Plann. Rev. 2015 (1) (2015) 40–48.
[84] Y. Gu, et al., Exploring the space use mechanism of high-density campus in urban Beijing, Habitat Int. 91 (2019) 102024.
[85] Y. Gu, Cities within Cities: an Examination of Urban Space Use and Transformation in Ancient and Modern Times, Technische Universität München, Munich, 2021, p. 328.
[86] E. Buitelaar, A. Bregman, Dutch land development institutions in the face of crisis: trembling pillars in the planners' paradise, Eur. Plann. Stud. 24 (7) (2016) 1281–1294.
[87] S. Dembski, *'Organic'approaches to planning as densification strategy? The challenge of legal contextualisation in Buiksloterham, Amsterdam.* Town Planning Review 91 (3) (2020) 283–304.
[88] S.H. Park, Can we implant an artist community? A reflection on government-led cultural districts in Korea, Cities 56 (2016) 172–179.
[89] S. Zhou, et al., Bridging the top-down and bottom-up approaches to smart urbanization? A reflection on Beijing's Shuangjing international sustainable development community Pilot, Int. J. Unity Sci. (2021) 1–23.
[90] M. Keane, Creative industries in China: four perspectives on social transformation. International journal of cultural policy 15 (4) (2009) 431–443.
[91] M. Sasaki, Urban regeneration through cultural creativity and social inclusion: rethinking creative city theory through a Japanese case study, Cities 27 (2010) S3–S9.
[92] J. Brown-Saracino, The Gentrification Debates: a Reader, Routledge, 2013.
[93] J.P. Steil, L.H. Delgado, *Limits of diversity: Jane Jacobs, the Just city, and anti-subordination.* Cities 91 (2019) 39–48.
[94] W. Wu, X. Niu, Influence of built environment on urban vitality: case study of Shanghai using mobile phone location data. Journal of Urban Planning and Development 145 (3) (2019) 4019007.
[95] W. Wu, X. Niu, M. Li, Influence of built environment on street vitality: a case study of west Nanjing road in Shanghai based on mobile location data, Sustainability 13 (4) (2021) 1840.
[96] A. Turner, Bottom-up community development: reality or rhetoric? The example of the Kingsmead Kabin in East London, Community Dev. J. 44 (2) (2009) 230–247.
[97] Hyesun Jeong, Patterson Matt, Starchitects in Bohemia: An Exploration of Cultural Cities from the "Top-Down" and "Bottom-Up, Urban Affairs Review 57 (6) (2021) 1656–1696.
[98] Isaac Cunningham, Platt Louise, Bidding for UK city of culture: Challenges of delivering a bottom-up approach "in place" for a top-down strategy led scheme, Journal of Place Management and Development 12 (3) (2019) 314–325.
[99] C. Rabbiosi, Urban regeneration 'from the bottom up' Critique or co-optation? Notes from Milan, Italy. City 20 (6) (2016) 832–844.
[100] V. Bosák, et al., Temporary use and brownfield regeneration in post-socialist context: from bottom-up governance to artists exploitation, Eur. Plann. Stud. 28 (3) (2020) 604–626.
[101] E. Dorostkar, M. Najarsadeghi, How to evaluate urban emotions using twitter social media? Cities 127 (2022) 103713.