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Everyday urbanism in Beijing's edge cities: on spatial and experience patterns

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ABSTRACT

The concentration of people in mega agglomerations in China has been challenging urban governance to reduce daily commuting by planning and investing in new edge cities. The main objective of this paper is to investigate everyday urbanism in two recently developed edge cities in Beijing by considering spatial conditions as well as resulting activity and experience patterns. The applied mapping surveys include land use distributions and density calculations via evaluating GIS data as well as field observations to investigate the typical experiences of 32 representative neighborhood walks. One of the main findings is the overall dependency of neighborhoods on rigid grid planning defining urbanism with large block sizes, resulting in walking experiences with a majority being dominated by compound walls along main roads and only 15% of walks being experienced along active frontages despite rather high urban densities with up to 300 residents per hectare.

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Urbanism; edge city; placemaking; Beijing; spatial practice; walkable cities

Introduction

In 1991, Joel Garreau proposed the concept of the edge city, to describe the third stage of development of the suburbanization of America. In his work, Edge City: Life on the New Frontier, he explained the edge city phenomenon by identifying key development characteristics (Garreau, 1991, 12–13). Along with the expansion of the mega urban agglomeration, the increasing time for everyday commuting has led to new incentives to mix land uses and to establish newly emerging centers in the periphery. This development trend can potentially provide opportunities for polycentric development due to newly emerging centers, but without any coordination and planning it can often lead to urban fragmentation and so-called cities without cities, as described by Thomas Sieverts (2004). To prevent this worst-case scenario of spatial fragmentation, governance worldwide has been challenged to promote spatial integration in emerging centers in the periphery via strategic infrastructural planning and investments, land use management, and placemaking incentives.

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In the 1980s, urban governance has planned and promoted specific economic development areas in Chinese mega cities, such as Beijing. The first incentives towards polycentric urban development were driven by the urgency to establish new industrial centers to prevent the spatial concentration of manufacturing industries in only a few urban areas (Wei, Chen, and Lu 2016). These first planned edge cities were mainly defined by industries and labor accommodations for factory workers as well as basic services. However, the economic growth and diversification of mega cities during the last 20 years led to new development trends in those urban peripheries. Most manufacturing industries have been gradually replaced by technology parks attracting emerging and well-connected economies(Zhao and Peng 2000). The overall speed of the economic and spatial development of Chinese mega agglomerations has mainly been enabled by the rapid infrastructural supply to secure functional but highly regulated urban spaces. The main research objective of this paper is to investigate how emerging edge cities integrate walkable urban environments to reduce traffic and to stimulate everyday social interaction in public spaces, which is an essential precondition of any placemaking.

Theory of everyday urbanism and placemaking

This investigation of everyday activities and experiences is key to understanding the complex relationship between people and places. Louis Wirth (1938) defined urbanism as the way we live in our cities, which can be studied by investigating population size, urban densities, and social structure. By mapping and observing everyday activities, we can learn from built spaces and their impact on human behavior. Any successful polycentric development requires residents to share and identify an urban area as part and ideally center of their everyday life. Once a place is only experienced as a dormitory settlement or transit space, there is a general trend of human beings interacting within a smaller radius of their actual home and to relate to a differing and often distant center (Gordon and Richardson 1996). Worldwide, rapid growth has promoted fragmentation trends in urban peripheries and thus residents experiencing a dependency on long-distance commuting to identify a place of belonging beyond the walls of their own dwelling (Lee 2007).

Chinese urbanization and edge cities

Increasing everyday commuting in Chinese mega cities indicate that there is a major need to promote a more integrated form of urbanism in emerging edge cities beyond the functional aspects of infrastructure and land use management (Lin, Allan, and Cui 2015). Guan et al. (2018) stated that peripheral areas of Chinese cities have been developed very rapidly, facing various sustainability concerns. Since central urban areas in Chinese mega cities are densely populated, newly emerging development areas in urban peripheries have been initiated via a decentralized development model and are commonly referred to as urban development zones (Zhang 2000). In recent years, this development zone-oriented expansion of mega urban agglomerations has entered a new stage: From previous industry-led urban expansions towards a transition to more complex edge cities providing workplaces for highly educated workforce. This shift towards building new centers for medium- to high-income residents implied an increasing demand for more diverse services and new expectations on higher living standards (J. Chen 2007, 91). The development zones are supported by open policies to attract

investment and can be divided into five different types according to certain classification standards: (1) Trade Development Zone, (2) Industry and Trade Development Zone, (3) Economy and Technology Development Zone, (4) High-Tech Development Zone, and (5) Bonded Development Zone (He 2012, 17).

Development zones enjoy some preferential policies since they play an increasingly important role in the national economy and the overall transformation of Chinese mega cities into more advanced hubs for services and manufacturing industries (H. Chen and Liu 2014). The urban development zones are usually located in strategic areas within the urban periphery to promote a more polycentric network of centers. Huang, He, and Wei (2016) stated that urban development zones are mostly situated on the outskirts to coordinate and manage urban growth. The main factors for identifying the locations of these development zones can be found in the vast availability of land and infrastructural considerations by connecting to already existing suburbs or villages providing basic road networks and utilities for the first development phase. Gu (2001) pointed out that urban development zones were often initiated with lower densities to link up to already built-up suburban areas and riverbanks. Finally, Ai and Wang (2001) commented that the early development followed the vision of establishing modern communities by integrating modern housing, workplaces, as well as services and leisure spaces to promote an everyday urbanism with less dependency on long-distance commuting.

During the last two decades, urban development zones have gradually been built and transformed into entities with higher population densities supplied by state-of-the-art infrastructure. An increasing number of these urban development zones could be technically identified as edge cities due to their size and land use composition. But beyond the functional aspects of providing housing, workplaces, and services, the overall interaction and experience in these new cities as lived places requires increasing scientific attention to discuss the overall potential for urban consolidation. However, the present research has focused more on policy and theoretical investigations of Chinese edge cities, with few or even no investigations on spatial structure and its impact on human perception and behavior. Based on its size and major investments into development zones during the last 20 years, Beijing was selected to identify suitable case studies of recent edge cities to assess their current state of everyday urbanism.

Edge cities in Beijing

Before any urbanism can be investigated in selected neighborhoods, the mega urban agglomeration of Beijing and its development need to be briefly introduced. The general urban growth of Beijing can be divided into the following stages: Before the 1950s, its spatial expansion centered around the districts of Dongcheng and Xicheng. After this development period, a group of colleges, universities, and research institutes were established in the Haidian District, and marginal clusters were built along the inner suburbs, first promoting a more polycentric development in the urban periphery (Li and Gao 2013). In the master plan of 1992, the local urban governance introduced two strategies to manage the commencing fast urban growth by initiating 14 satellite cities and 10 subcenters around the central city which have been gradually transformed into development zones. In 2020, Beijing was comprised of 16 municipal-level development zones and three national-level development zones (Figure 1). Beijing's urban agglomeration has significantly expanded in the 21st century, and according to Tian, Wu, and Yang

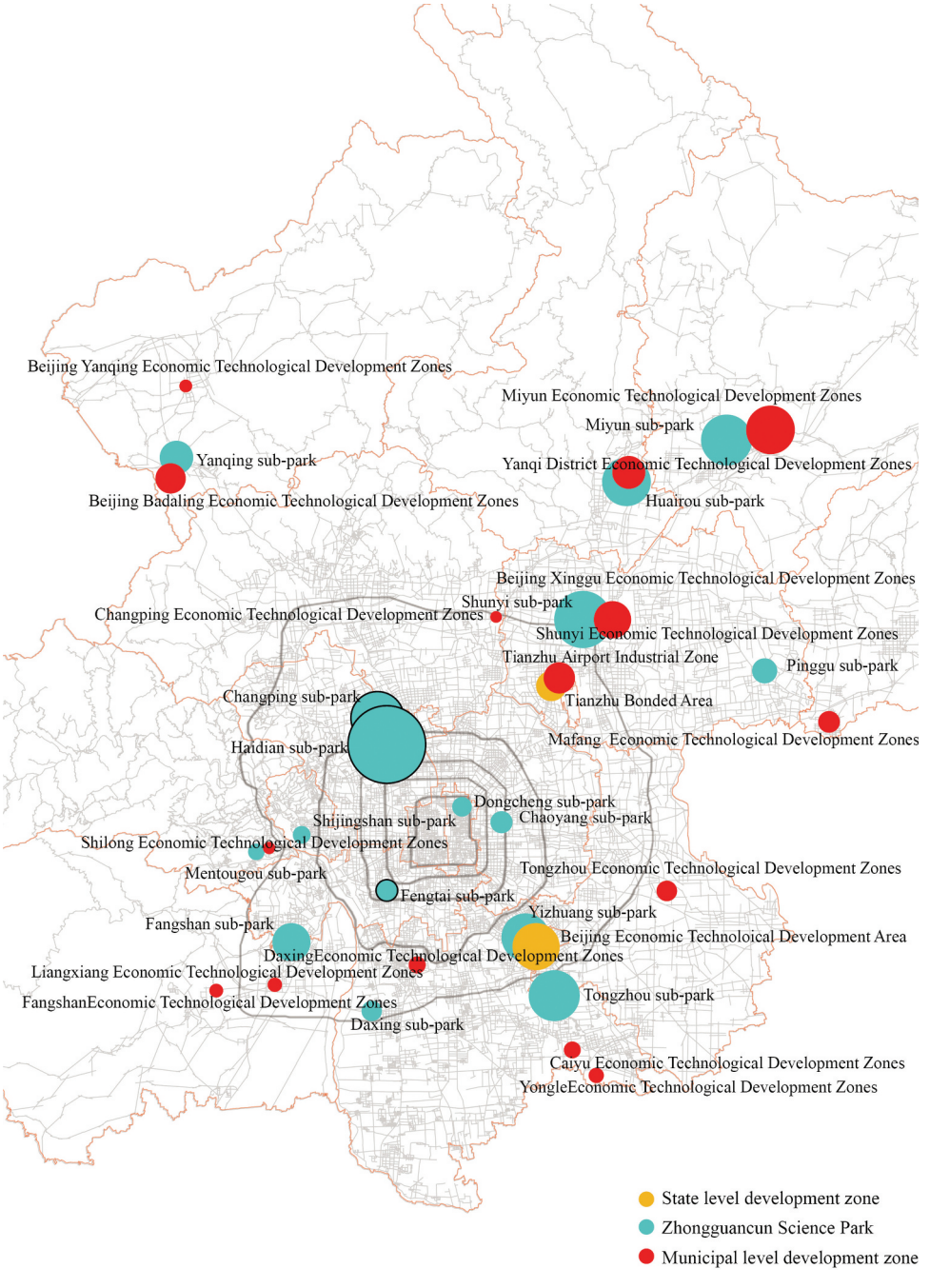


Figure 1. Location map of all development zones in Beijing's urban agglomeration in 2020. (Source: authors).

(2010) Beijing's rapid urban expansion has continued to follow a concentric pattern, also referred to as layered expansion.

According to the Beijing Statistical Yearbook (published annually from 2001 to 2021) the planned area and the built-up area in most municipal development zones were rather stable in the last 10 years, and no new development zone was under construction. Some of the development zones have experienced no major changes in urban form during the past 20 years, such as Shunyi Science and Technology Innovation Zone and Caiyu Economic Development Zone, whose overall scale was relatively small in the planning stage. The Beijing Statistical Yearbook shows that the business development in most municipal development zones has been intensifying year by year, but in some districts, local industries have witnessed a decline, as in the case of Linhe Industrial Development Zone, Fangshan Industry Zone, and Changping Xiaotangshan Industrial Zone. These development zones have poor traffic conditions because of no direct link to one of the six ring roads.

By 2020, in addition to development zones 16 sub-parks of the so-called Zhongguancun's Science Park have been established in almost every major district of Beijing. According to Figure 1 some municipal development zones and Zhongguancun's Sub-Parks have been developed next to each other. The sub-parks within the six ring roads and those in the outer suburbs share the same economic trends as in municipal development zones. The sub-parks of Haidian, Tongzhou, and Changping currently rank at the top in promoting local businesses. The Beijing Statistical Yearbook demonstrates that the Haidian Sub-Park ranks first in both construction scale and economic growth. As the earliest development area in Zhongguancun, the Haidian Sub-Park is the core of Zhongguancun, also known as the Silicon Valley of Beijing (Li and Gao 2013). It used to be at the fringe of the urban periphery in the year 2000. Today it is surrounded by urban expansions, and it has emerged as a new major urban center.

According to the Beijing Statistical Yearbook, the Beijing Economic-Technological Development Area (BDA) is unquestionably the second leading development zone next to the Haidian Sub-Park (HSP) in terms of the planned area, built-up area, and business data, superior to all the municipal development zones and the national development zone of Beijing Tianzhu Bonded Area. Yizhuang, where BDA is located (Figure 2), is a key node in Beijing's eastern development strategy, and local governance has been focusing on the development of comprehensive service functions to propel the shift from the state of a development zone towards an emerging edge city. Yizhuang Sub-Park in Zhongguancun is another essential part in current strategies to strengthen polycentric urban growth in Beijing's mega urban agglomeration. In comparison to all 16 sub-parks in Zhongguancun and other development zones, BDA and HSP are the largest and most established development zones in Beijing and are thus selected as case studies for the following investigation.

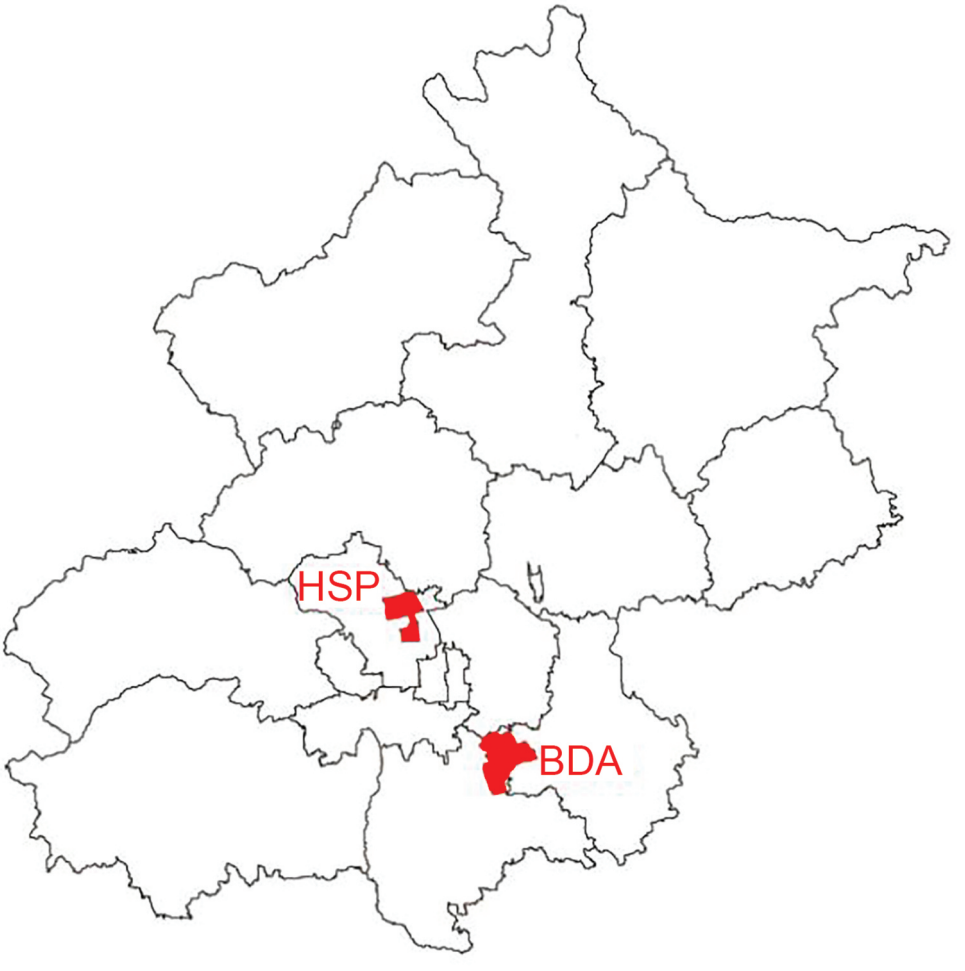


Figure 2. The locations of BDA and HSP in the southeast and northwest of Beijing. (Source: authors).

Theoretical framework and methodology

The study of everyday urbanism has a rather specific history, mainly rooted in the theories of Henri Lefebvre on the production of space ([1974] 1991). As Wiedmann and Salama (2019) pointed out, Henri Lefebvre's dialectic excursions on how spatial practices can be studied are still valid today. According to him urbanism, the way we live in our cities, is the result of accumulating conceived notions of the past, which have been applied in the present moment in the realm of our everyday spatial practices. This results in the production of key patterns creating rhythms of the everyday (Figure 3). Spatial patterns are the result of strategies and developments to cater markets, while markets themselves can be studied in the form of activity patterns (Wiedmann, Salama, and Mirincheva 2014). And both patterns produce patterns of spatial experiences of individuals which are collectively shared, and which can have a major impact on future spatial practices.

To study the current walking patterns of residents and their experiences of urban surroundings, various interrelated patterns need to be identified first, which are the

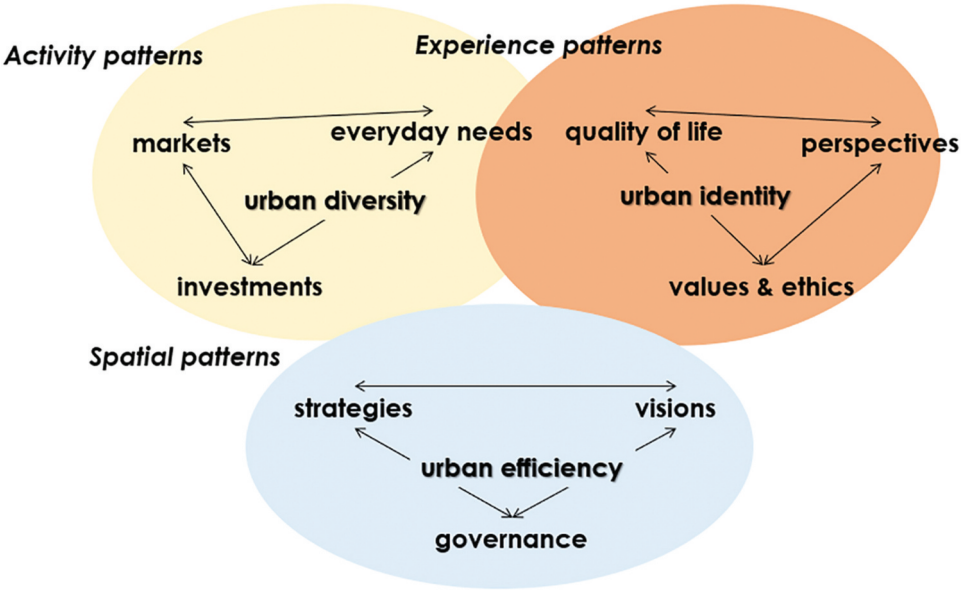


Figure 3. The interdependent production of sustainable urbanism and the key sources of the three main urban qualities. (Source: authors).

product of both time and space: Spatial patterns, activity patterns, and resulting experience patterns. Existing spatial patterns are analyzed based on mapping surveys via available public GIS data, including densities, land uses, and public transit stops. Built densities are explored by calculating the residential gross floor area of the various urban typologies and the associated floor area ratio. Urban densities are calculated by surveying the number of housing units and by applying the typical household size in Beijing of 2.62 residents per household in line with the data of the National Bureau of Statistics (2021). The current uses of buildings and open spaces and the distribution of public transit stops were surveyed via both official GIS data and field studies to secure updated information on commercial areas and transit routes.

In addition to the existing spatial patterns of urban typologies, their densities, functions, and transit links, the resulting everyday activity patterns were surveyed via scenarios. This approach is most effective if applied in rather typical space-to-space relations, such as the walk to schools and supermarkets, which are most relevant for urban design and planning interventions. Furthermore, certain demographic, socio-economic, and socio-cultural studies can support a more realistic scenario. After careful considerations and investigations, one typical scenario was selected for this study to be applied in each neighborhood: One key activity was identified as the walk to the next public transit stop assuming that workplaces are accessible via public transit. Further, key activities are the everyday walks to schools and supermarkets, as well as leisure spaces, such as parks and shopping malls. These weekly activities were mapped to understand the typical distances and to test the overall walkability for each neighborhood. Based on the assumption that walks with a duration of more than 20 minutes would be avoided via public transit or

other modes of transport, the field surveys of routes were selected accordingly to investigate the experiential patterns.

This final methodological approach aimed to identify the typical experiences of realistic walking routes in all case study neighborhoods. As in any newly built environment, these experiences often repeat, and it is key to understand the implications of these experiences for comfort and safety as well as spatial orientation to encourage everyday walking. The everyday image of a place is mainly shaped by these experiences. The field surveys focused on key elements of the experiences, such as the role of traffic, green open spaces, and active frontages or walls along the surveyed walking routes. Traffic is always experienced as a major factor for comfort and safety due to noise, pollution, and potentially problematic street crossings. Green spaces, on the other hand, can be experienced as an important component stimulating the walking experience by improving both visual and climatic aspects if views are not obstructed and orientation hindered. Active frontages can stimulate social interaction, as in the case of any services or just the possibility to meet neighbors at building entrances. Compound walls and other forms of built edges can lead to less street observation, less social interaction, and thus an experience of less urban safety. Due to the dimensions and quantity of routes, the study is focused on these essential aspects of walking experiences. After the survey, the various experiences of street sections were mapped, and percentages were calculated to enable a quantitative evaluation and comparison.

Spatial patterns

The land use distribution (Figure 4) of BDA and HSP follows the general planning rationale of locating large mono-functional commercial areas, mainly in the form of offices, in the center of both development zones. Residential areas follow along the periphery of the

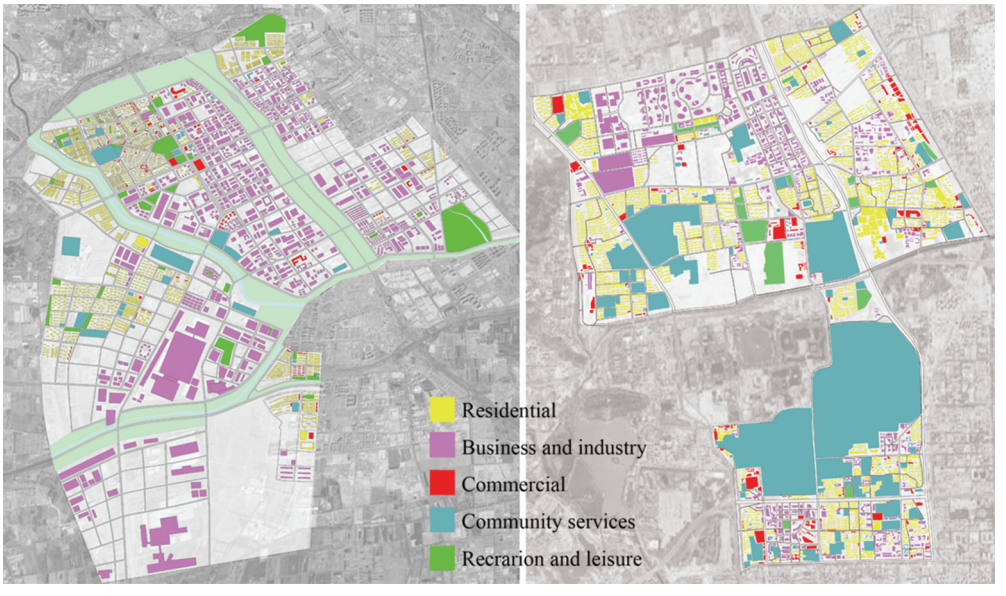


Figure 4. Land use distribution in BDA (left) and HSP (right). (Source: authors).

business district and large areas are dedicated to social infrastructure, such as hospitals and education facilities. BDA's most distinct spatial feature can be identified in large 300- to 500-meter-wide green corridors to support urban ventilation and to cater for various open space uses, from golf courses to public parks. HSP, on the other hand, is mainly identifiable because of its north-south business spine, which is more compact and thus more accessible by adjacent neighborhoods.

To investigate the spatial patterns of neighborhoods, the existing and inhabited neighborhoods in BDA's north-west have been explored. In the case of HSP, overall, 32 neighborhoods were strategically selected for analysis (Figure 5). Both BDA and HSP provide different residential typologies: villas, multistory apartment buildings, and towers. It should be noted that the mixed-use residential buildings, marked in blue, have shops on ground floors and residences on upper floors. The map shows that low- to medium-rise buildings dominate the neighborhood areas in both case studies, but their typology differs: BDA has many 3–4 story buildings in addition to the traditional 6–7 story row buildings. Low-rise buildings are occupied by only a few households (usually 4–8 families per building), and they are found in the upper real-estate market. BDA's residential high-rises reach building heights of 13 to 20 floors, while only a few high-rise compounds can be found in HSP.

The public transit map shows that a subway line connects BDA with Beijing's centers, passing through the residential area and ending at Yizhuang railway station (Figure 6). In addition, 17 bus routes have been established in the investigated residential areas. Five of those bus routes are located within the development area, seven bus routes link BDA with main central areas in Beijing and five bus routes

Figure 5. Housing typologies in BDA (left) and HSP (right). (Source: authors).

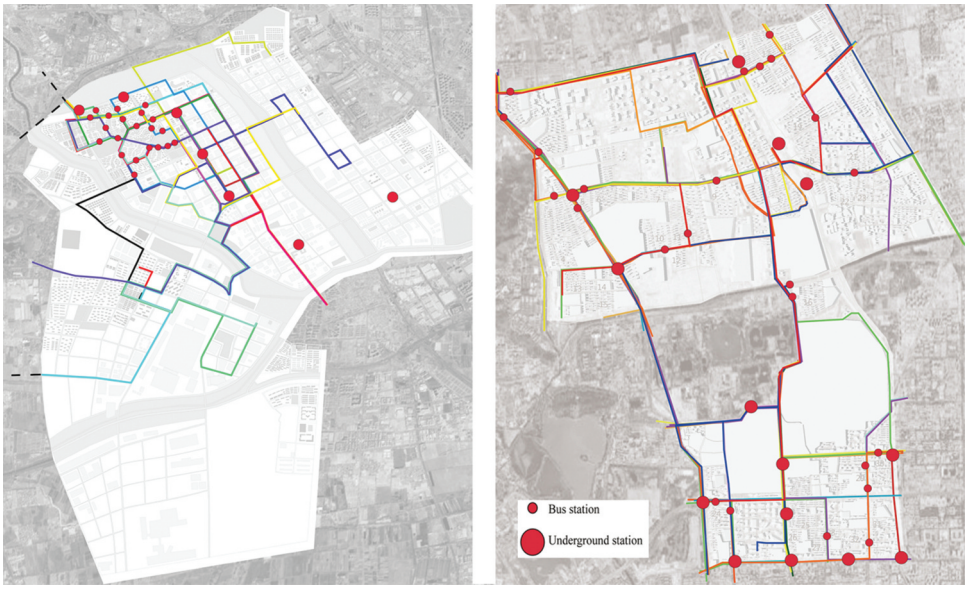


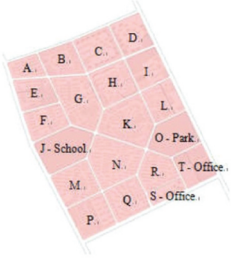
Figure 6. Public transit map in BDA (left) and HSP (right). (Source: authors).

connect the area with Yizhuang's new expansion. There are currently plans to add new tram lines (Xia et al. 2017). In HSP, 32 selected communities were investigated regarding their access to public transit. The more focused distribution of public transit stops along outer and inner corridors does not guarantee that every neighborhood has at least one bus stop, as illustrated in the mapping survey. Overall, 51 bus routes were counted as passing through the investigated communities. And HSP is, in comparison to BDA, more accessible via metro due to a total of 13 metro stations with five metro lines passing through leading to a higher connectivity with Beijing's main centers.

The following survey summarizes the built and urban density of the two case studies: The average-built density and thus floor area ratios in the selected residential areas reach an average of 111% in BDA and 171% in HSP (Tables 1 and 2). And the total population of BDA is around 49,452 residents, while approximately 104,088 residents can be expected in the 32 communities in HSP by taking average household sizes into account (2.62 persons per household according to the 7th census data in 2020). This leads to an average urban density of 187.3 per hectare in BDA and 282.2 per hectare in HSP.

In summary, it can be stated that the spatial patterns of BDA and HSP share that they are formed by a main grid and large plots, which are usually built by one or two major developers in form of large-scale residential compounds forming each neighborhood. The average plot size is significantly smaller in HSP leading to higher densities, while the newer BDA-neighborhoods offer significantly more open space. Another significant difference is that the residential area of BDA is more cohesively planned and developed in a shorter period in the west of its commercial zone, while HSP's neighborhoods are more spread out around its central commercial spine.

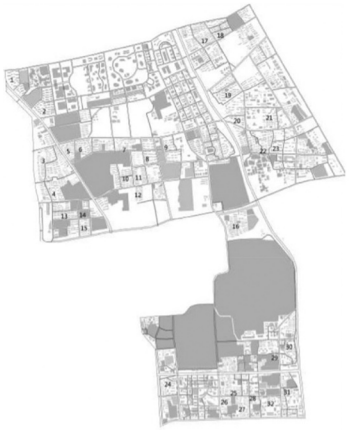
Table 1. Key figures of BDA (currency: Yuan).



Neighbourhood	Gross Floor Area m^2	Plot area m^2	Floor area ratio	Number of households	Number of people living in each neighborhood	Living space per person m^2	Price/ m^2
A	140,859	87,524	1.60	702	1,839	77	51,095
B	82,119	144,041	0.57	177	464	177	76,918
C & D	582,120	179,838	3.24	3,495	9,157	64	40,525
E	160,258	133,836	1.20	1, 134	2,971	54	34,061
F	85,878	145,379	0.59	480	1,258	68	50,643
G	225,699	249,591	0.90	2,192	5,743	39	53,749
H	356,973	190,986	1.87	1,950	5,109	70	47,382
I	128,568	149,917	0.86	632	1,656	78	47,441
K	130,620	262,263	0.50	650	1,703	77	55,254
L	50,502	153,005	0.33	146	383	132	37,532
M	201,188	185,172	1.09	1,455	3,812	53	53,897
N	106,794	264,552	0.40	1,370	3,589	30	58,116
P	103,716	176,143	0.59	276 villas, 686 flats	2,520	41	45,866
Q	273,870	170,738	1.60	2,196	5,754	48	55,637
R	186,171	147,755	1.26	1,334	3,495	53	60,787
Average	187,689	176,049	1.11	1,280	3,297	71	51,260

Source: authors, house prices and number of households from housing agents: anjuke.com, Fang.com and Lianjia.com, 2022.

Table 2. Some key figures of HSP (currency: Yuan).



Neighborhood	Gross Floor Area m^2	Plot area m^2	Floor area ratio	Number of households	Number of people living in each neighborhood	Living space per person m^2	Price/ m^2
1	265,291	120,587	2.2	585	1,533	173	110,226
2	297,234	202,200	1.47	1,052	2,756	108	104,677
3	216,384	200,356	1.08	1,427	3,739	58	86,131
4	397,911	361,737	1.1	1,227	3,215	124	84,637
5	157,537	82,914	1.9	1,708	4,475	35	81,895
6	168,456	110,826	1.52	496	1,300	130	106,313
7	274,357	122,481	2.24	1,723	4,514	61	82,843
8	374,741	162,931	2.3	1,756	4,601	81	55,844
9	107,763	63,390	1.7	1,055	2,764	39	50,810
10	182,643	114,152	1.6	1,406	3,684	50	46,969
11	126,612	117,233	1.08	1,264	3,312	38	102,972
12	100,549	64,044	1.57	756	1,981	51	94,055
13	113,261	100,231	1.13	742	1,944	58	100,111
14	75,950	30,380	2.5	582	1,525	50	46,904
15	492,400	246,200	2.0	1,644	4,307	114	117,609
16	197,686	101,900	1.94	782	2,049	96	133,835
17	181,137	108,465	1.67	1,223	3,204	57	91,457
18	196,620	174,000	1.13	813	2,130	92	76,507
19	341,000	200,588	1.7	2,191	5,740	59	94,549
20	90,737	60,491	1.5	530	1,389	65	79,836
21	227,781	87,608	2.6	1,858	4,868	47	79,393
22	52,984	26,492	2.0	344	901	59	85,502
23	151,934	67,526	2.25	1,264	3,312	46	114,818
24	230,989	177,684	1.3	2477	6,490	36	118,910
25	121,074	100,895	1.2	1,593	4,174	29	166,253
26	161,001	107,334	1.5	1,873	4,907	33	154,144
27	169,200	120,857	1.4	2,296	6,016	28	155,195
28	79,210	49,506	1.6	1,230	3,223	25	117,435
29	36,375	24,250	1.5	259	679	54	144,855
30	316,750	126,700	2.5	2,475	6,485	49	140,457
31	47,810	24,901	1.92	312	817	59	132,414
32	48,794	29,044	1.68	784	2,054	24	150,432
Average	187,568	115,247	1.71	1241	3,253	63	103,375

Source: authors, house prices and number of households from housing agents: anjuke.com, Fang.com and Lianjia.com 2022.

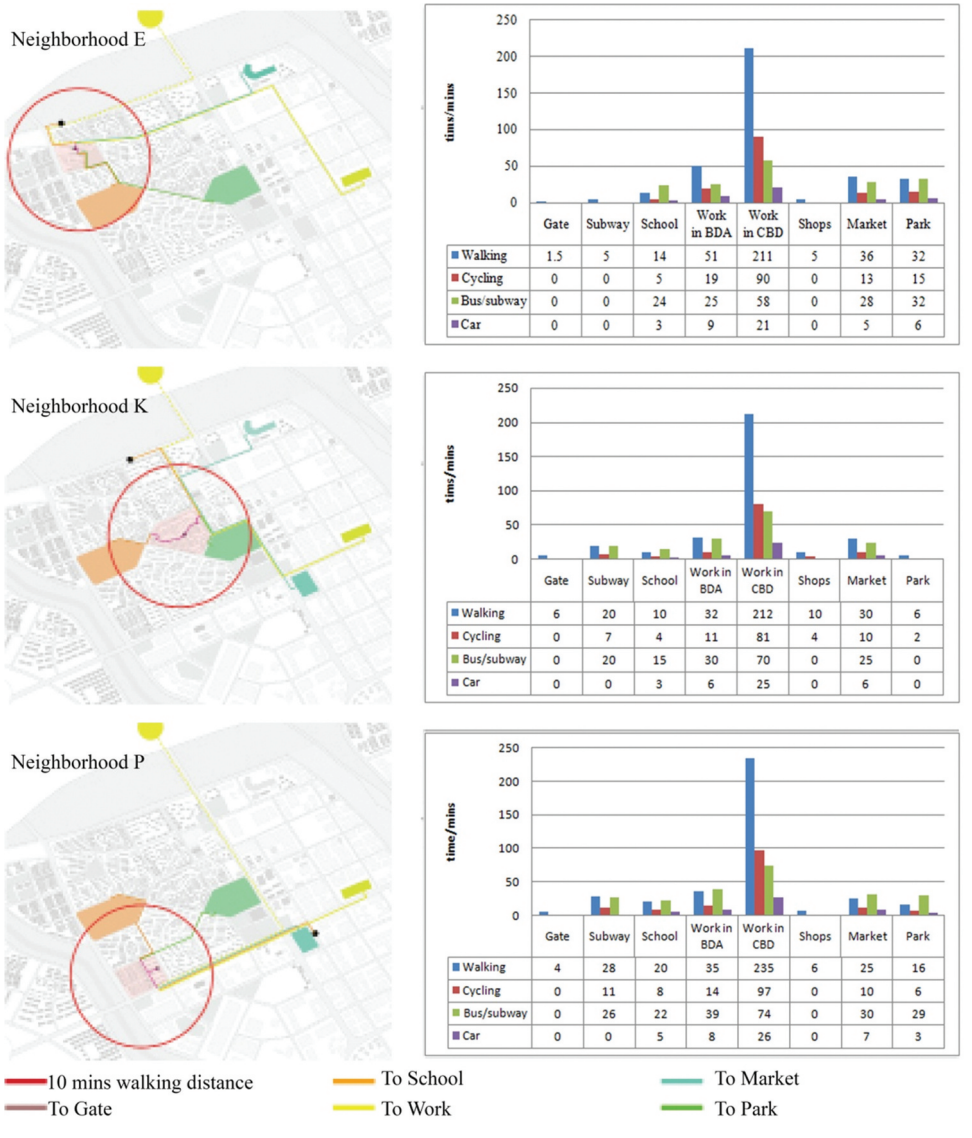


Figure 7. Mapping of everyday activities in three neighborhoods in BDA. (X-axis: activities; Y-axis: minutes). (Source: authors).

Activity patterns

Figure 7 shows the weekly activity routes of three neighborhoods in BDA, and the diagrams show the average time taken by each activity differentiating the mode of transit in comparison to walking. Most neighborhoods are gated with differing degrees of access: Some neighborhoods require key cards and personal identification, while others have an open gate with or without guard. As a result, people who want to travel on foot must spend a significant time walking from their residence to the neighborhood's gate. Residents of the investigated communities in BDA need to walk at least 20 minutes to reach the nearest subway station and thus mainly rely

on rather accessible bus stops (5–10 minute-walks) to travel to the subway or other destinations within BDA.

According to the mapping survey residents would spend most of their commuting time on journeys to workplaces. And for residents still working in central Beijing, one-way trips would usually take at least 25 minutes by car and about 70 minutes by bus, but without taking traffic congestion into account. Schools are well provided within an average radius of around 15 minutes. There are no high-streets or shopping malls within the residential area, residents would thus need to travel to do their weekly grocery shopping due to an average walking distance of more than 30 minutes. However, some scattered community services are supplied in and around neighborhoods at certain corners and a central park is rather accessible by adjacent neighborhoods.

For the analysis of HSP, a representative sample of nine of the 32 neighborhoods was selected to analyze daily activity patterns. The nine communities were selected in different residential clusters of the area, ensuring a diversity of housing types, locations, and years of construction. According to the activity survey in Figure 8, the residents' daily lives are more dependent on the main road grid. The red circles (10-minute walking radius) illustrate that very few activities can be reached at convenient walking distances. Tables 3 and 4 document that residents of the gated communities in HSP still require approximately 5 minutes of walking time to reach the entrance of their compounds.

The average walking distance to get to nearby bus stops takes about 8 minutes. Primary schools are accessible with an average walking time of 15 minutes. Most residents in the area have a longer average distance to public leisure spaces, with an average walk of 22 minutes to the nearest park. The distribution of shopping malls and main commercial services (e.g. weekly groceries) is also largely dependent on public transit, cycling, or car travel. Short walking trips to workplaces are completely out of reach for most of the neighborhoods, and even the use of public transit can still take up to an hour of daily commuting. Thus, despite the location of an integrated central commercial spine, the strict functional land-use division, and residential typologies in the form of mega compounds have led to an evident dependency on cars or public transit options. Due to the generally higher income, car ownership has been increasing in HSP leading to a new lifestyle of mobility, which, however, has been leading to increased traffic congestion (Wang 2021).

Experience patterns

Based on the previous activity mapping of everyday routes, key experience patterns can be studied. To establish a realistic sample of routes which could be experienced by everyday walking, the selected routes cannot exceed a walking distance of 20 minutes. Overall, 32 routes in 12 neighborhoods have been explored in both BDA and HSP via field studies to investigate the typical representations of existing spatial conditions (Table 5). Despite field studies and walking tours of almost 18 hours only four key experiences can be distinguished, which is the result of the rapid development and rather restricted planning guidelines and policies: One experience is the walk through a private compound, which can be experienced in just 1–2 minutes or up to 7 minutes depending on the size and location of the residence. Since residential compounds are rather large, on average 14.6 hectare, most movement concentrates along the main grid with multi-lane

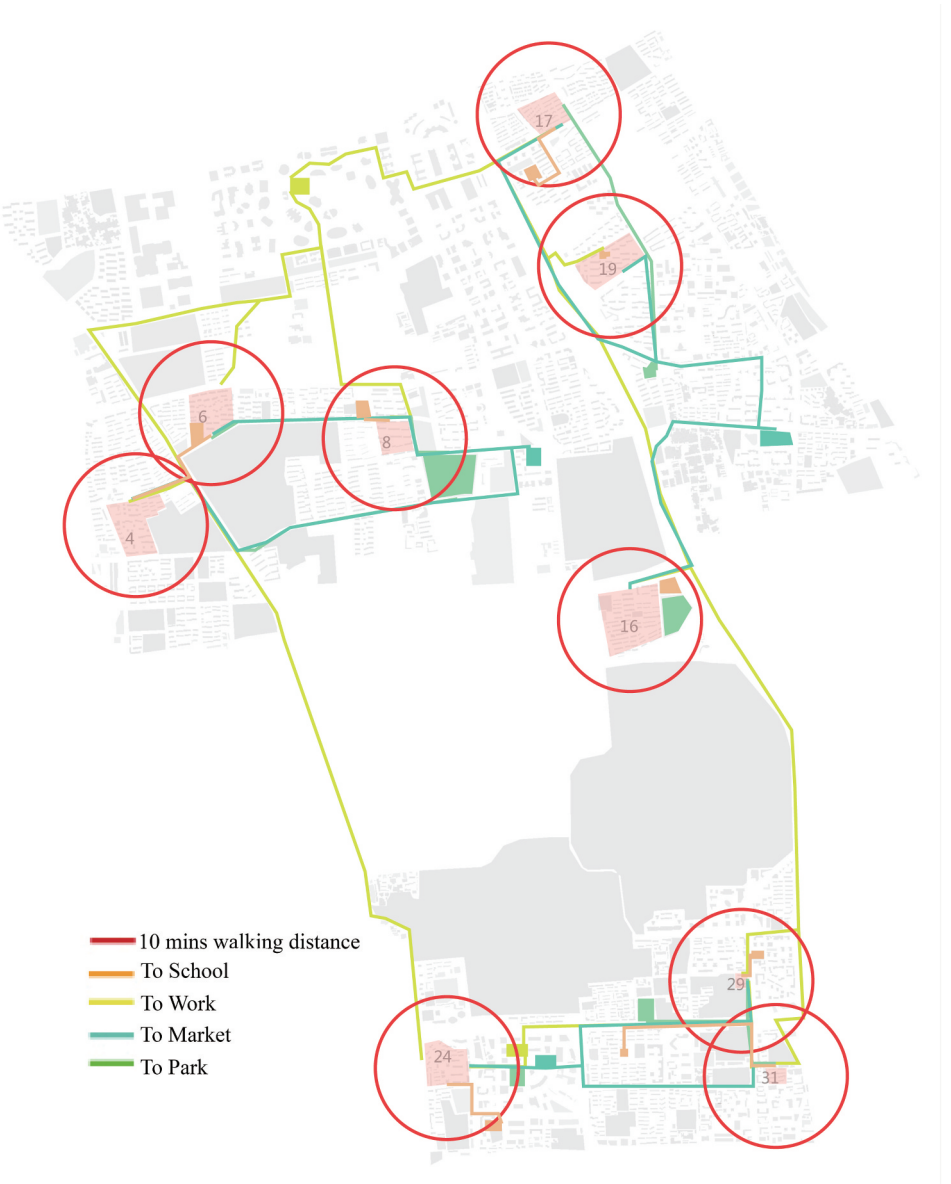


Figure 8. Mapping of typical activities in the case of nine neighborhoods in HSP. (Unit: minutes). (Source: authors).

roads and heavy traffic. However, in addition to major traffic arteries, another major element of the experience patterns can be identified by either dominant compound wall, landscaping, or commercial use.

The average walking time of all investigated walks is around 17 minutes and the most dominant experience with a share of 38% of all walks are walks between compound walls and main traffic routes followed by similar walks along those roads but with dominant landscaping features (19%) and with commercial use (15%), mainly in the form of smaller

Table 3. The time spent for activities in nine HSP-neighborhoods.

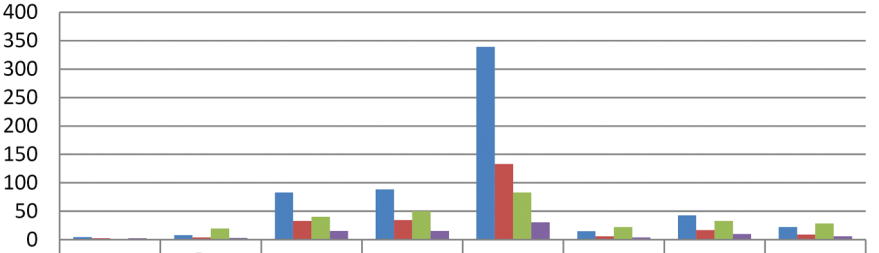
Neighborhoods 4	Gate	Bus	Work in Soho	Work in Zpark	Work in CBD	School	Market	Park
Walking	3	8	97	80	387	30	57	44
cycling	2	3	38	30	153	13	22	17
Bus/subway	–	–	40	54	78	26	35	38
car	2	4	12	15	32	6	11	9
Neighborhoods 6								
Walking	–	5	107	43	393	13	47	43
cycling	–	2	42	16	153	5	18	16
Bus/subway	–	21	41	35	81	–	32	29
car	–	3	17	8	35	3	8	7
Neighborhoods 8								
Walking	4	2	114	38	371	6	32	19
cycling	2	1	44	15	146	2	12	7
Bus/subway	–	–	53	38	88	–	23	24
car	2	1	15	7	35	2	7	5
Neighborhoods 16								
Walking	6	4	66	84	314	11	44	4
cycling	3	2	26	33	124	5	18	2
Bus/subway	–	21	32	41	77	19	35	26
car	3	3	15	15	33	3	11	7
Neighborhoods 17								
Walking	7	10	140	39	373	7	59	40
cycling	3	5	54	15	145	3	24	16
Bus/subway	–	17	59	33	77	–	37	25
car	3	3	25	8	31	3	12	12
Neighborhoods 19								
Walking	–	2	124	63	353	2	39	23
cycling	–	1	51	26	137	1	16	9
Bus/subway	–	–	51	46	84	–	36	20
car	–	1	25	13	31	1	10	5
Neighborhoods 24								
Walking	–	11	17	140	305	22	30	18
cycling	–	7	7	53	122	9	11	7
Bus/subway	–	20	23	80	80	20	26	23
car	–	5	5	21	26	6	8	5
Neighborhoods 29								
Walking	3	14	39	146	292	8	16	16
cycling	2	5	16	57	113	3	6	6
Bus/subway	–	16	35	65	87	–	20	47
car	2	5	10	25	26	4	7	4
Neighborhoods 31								
Walking	–	4	41	160	262	15	35	24
cycling	–	2	17	64	102	6	14	10
Bus/subway	–	–	30	58	76	24	29	22
car	–	2	11	26	24	8	11	5

Unit: minutes. Source: authors

shops. The remaining 25% and thus a quarter of an average walking experience can usually be found in the private or semi-private precincts of compounds. On average, there are only 0.78 encounters of commercial services per investigated walking route, and there were no encounters of any shops in the case of 17 out of 32 routes (53%). On average, there are 2.19 crossings per walking route, which needs to be highlighted since most main roads have four to eight lanes. The resulting stop-and-go experience is another important factor impacting the overall impression of a rather car-oriented environment.

Very similar experiences can be found in the case of HSP: There is, however, a higher concentration of commercial use and other major services along the Southern link known as North 4th Ring Road, which is one of the bigger hubs of public life in the North-Eastern

Table 4. Distances of everyday activities for nine neighborhoods in HSP.



	Gate	Bus station/subway	Work in SOHO	Work in Zpark	Work in CBD	School	Market	Park
Walking	4.6	7.9	82.8	88.1	338.9	14.7	42.7	22.11
cycling	2.4	3.8	32.8	34.3	132.8	6.1	16.8	8.7
Bus/subway		19.8	40.4	50	82.9	22.2	33	28.6
car	2.4	3.1	15	15.3	30.3	4.1	10	5.7

Unit: minutes. Source: authors.

part of Beijing. The field observations of the four main links share a dominant presence of traffic in common, including pedestrian bridges and overpasses as well as parking sites. Some of the main shared experiences of all residents can thus be identified as rather typical for a newly built suburb with a diffuse center and a high level of fragmentation. While all residents must move between their residences and workplaces, there is no shared high street on a neighborhood- and district-level with typical pedestrian dimensions and directly accompanied by integrated public spaces and services, such as parks. The only bigger park is located in BDA and is surrounded by inactive roads without any commercial use and thus only serves adjacent neighborhoods as recreational space rather than contributing to a commonly shared image of this edge city. Commercial uses are mainly distributed in strategic and accessible locations by car, and everyday consumption experiences can thus mainly be found in local shopping malls.

Discussion

The main objective of this study is to identify the typical spatial patterns and their spatial experiences of everyday urbanism in emerging edge cities in Beijing. According to the case studies and the conducted mapping surveys, there is a certain diversity of housing typologies, while the overall grid is rather similar and based on large plots to enable an efficient development. Both case studies have led to clear insights about the current state of establishing emerging edge cities in mega urban agglomeration, such as Beijing. The rather fast development of both urban areas has been focused on supplying key infrastructure leading to large urban blocks and thus large patches of mono-functional land uses. The overall urban densities differ from any typical suburb in the United States and reach 180 to 280 inhabitants per hectare, which is rather comparable with many European cities and their central urban districts. This can be identified as a major strength of

Table 5. A sample of everyday walking routes in BDA and HSP.

Neighbourhood	Routes	Compounds /mins	Along traffic roads with walls /mins	Along traffic roads with trees/mins	Along traffic roads with commercial	Final destination /mins	Encounters with the commercial services
	1	1.6	0	8	3	Metrostation:12.6	1
	2		8	4	2	School: 15.6	1
	3		0	10	4	Shops:15.6	0
	1	6	5	1	0	Park:12	0
	2		0	4	6	School:16	2
	3		5	11	0	Shops:22	0
	1	4	8	10	2	School:24	1
	2		2	4	0	Shops:10	0
	a	3	9	0	11	Metrostation:23	2
	b		11	0	0	Shops:14	0
	c		13	0	1	Market:17	1
	a	-	12	0	0	Metrostation:12	0
	b		6	0	0	School：6	1
	c		2	0	0	Shops：2	0
	a	4	13	6	0	Park:23	0
	b		5	0	1	School：10	1
	c		17	0	0	Shops:21	0
	a	6	0	4	0	Park:10	0
	b		6	3	2	School：17	1
	a	7	2	11	0	Metrostation:20	0
	b		0	7	0	School：14	0
	c		0	6	4	Shops:17	2
	a	-	10	5	0	Metrostation:10	1
	b		2	0	0	School：2	0
	a	-	5	3	9	Metrostation:17	1
	b		6	2	10	Park:18	4
	c		13	0	9	School：22	2
	a	3	16	0	0	Park:19	0
	b		8	0	0	School:11	0
	c		9	0	7	Market:19	2
	a	-	10	7	0	Metrostation:17	0
	b		4	0	11	School：15	2

Source: authors.

integrating many everyday destinations for walking and cycling as well as transit-oriented development.

Many community services, such as schools, have been clearly planned and developed in walkable catchment radii. Major efforts have also been undertaken to landscape the main traffic routes, with around 20% of all investigated everyday routes being dominated by trees and other landscaping features to balance the experience of increasing traffic. Most private compounds include large areas of landscaped spaces, leading to an overall average walking experience of up to 45% being accompanied by vegetation. On the other hand, a large part of the walking experience is still dominated by compound walls and multi-lane roads. Roads are often experienced as hazardous, especially for younger children, and can only be crossed by designated crossings, which are usually far apart. There are only a few encounters of shops, and no commercial high streets specifically designed for pedestrians can be found in both districts. This lack of accessible commercial services being located along key corridors with many public amenities can be discussed as the main weakness in both case studies, since any placemaking and as such, any traditional understanding of a city depends on centralities and a shared open market, which is both accessible and diversified to attract various interests of all social groups.

Conclusion

The traditional Chinese market street has not found its modern translation and development in neither BDA nor HSP: instead, the typical suburban model of building shopping malls has been followed, leading to replaceable and privatized consumption spaces instead of an opportunity for public life to emerge around a unique image of a new city. Therefore, compared to Garreau's description of edge cities, Beijing's emerging edge cities offer suitable population densities and accessible business areas, but lack pedestrian friendly environments. In the future, this vacuum of shared market streets and public corridors linking neighborhoods needs to be addressed by investigating the potential to open bigger compounds and to establish smaller blocks instead to integrate new walking patterns and experiences. An increasing application of urban design interventions would permit the development of a new layer of pedestrian movement inside those previous compounds rather than along the main access roads dominated by heavy traffic.

The rigid grid has enabled rapid development and even distribution of traffic, but it has also led to replaceable spaces with hardly any identifiable spaces of public life. The new walking corridors could be enriched by plazas and playgrounds as well as integrated commercial or social services (e.g. nurseries). The role of new and linked public spaces is vital to attract everyday walks resulting in new explorations and social encounters and leading to long-term investments of families and even generations. Both edge cities in China and edge cities in the United States face the rather problematic dominance of privatized spaces. While low-rise suburban patterns rooted in private properties can hardly be revised and densified, Chinese super blocks and gated communities offer the opportunities of urban design interventions to add a new layer of public links and spaces, and thus the potential of replacing mono-functional dormitory islands and forming lived

spaces for connected neighborhoods. These links can encourage walking and this pedestrian movement can encourage new market and leisure activities, which are key to produce the centralities and the associated imageability of a new city.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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