Regional Studies, Regional Science

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/rsrs20

Location dynamics of coworking spaces in China: insights from Beijing metropolitan

Shifu Zhang, Carles Méndez-Ortega & Ilaria Mariotti

To cite this article: Shifu Zhang, Carles Méndez-Ortega & Ilaria Mariotti (2024) Location dynamics of coworking spaces in China: insights from Beijing metropolitan, Regional Studies, Regional Science, 11:1, 523-541, DOI: 10.1080/21681376.2024.2381641

To link to this article: https://doi.org/10.1080/21681376.2024.2381641

REGIONAL STUDIES, REGIONAL SCIENCE
2024, VOL. 11, NO. 1, 523–541
https://doi.org/10.1080/21681376.2024.2381641

Location dynamics of coworking spaces in China: insights from Beijing metropolitan

Shifu Zhang [a], Carles Méndez-Ortega [b,c] and Ilaria Mariotti [a]

ABSTRACT

This paper explores the location determinants of coworking spaces (CSs) in the Chinese capital of Beijing, thus filling the gap in the literature about CS location in urban China. The study applies a count data model (CDM) to the data collected in 2022 to answer three research questions: (1) Where are CSs located and what are the location determinants? (2) How does Beijing's urban structure affect CS location determinants? (3) What role do creative industry specialisation, variety, government facilities and incentives play in CS location? The findings reveal that CSs in Beijing – most of them promoted by public authorities – tend to cluster in the central city where there is a high diversity of knowledge-intensive and creative industries. The semi-polycentric urban structure of Beijing affects the location of CSs by creating localised activity hubs. Furthermore, the study finds evidence that creative industry specialisation and variety are crucial factors in CS location. In addition, government facilities and incentives play a key role in driving their locations.

ARTICLE HISTORY

Received 26 January 2024; Accepted 14 July 2024

KEYWORDS

Coworking spaces; location determinants; Beijing; spatial lag model; creative industry; government incentives and facilities

JEL

R12; R30; O18

1. INTRODUCTION

Several definitions of coworking space (CS) are provided by researchers from various disciplines. Spinuzzi (2012) defines CSs as open-plan environments where users work with other unaffiliated professionals for a fee. For Moriset (2011), it is a potential 'serendipity accelerator' beyond the room layout; it is first an atmosphere, a spirit and a lifestyle. Capdevila (2013) defines CSs as localised spaces where independent professionals work, sharing resources and their knowledge with the rest of the community. CSs help freelance designers become more embedded in business networks (in terms of collaborations), both local and foreign, compared to working in isolation as lone wolves (Avdikos & Kalogeresis, 2016). In addition, it provides individuals

CONTACT Carles Méndez-Ortega cmendezor@uoc.edu
[a] Department of Architecture and Urban Studies, DAStU-Politecnico di Milano, Milan, Italy
[b] Faculty of Economics and Business, Open University of Catalonia (UOC) and i2TIC Research Group, Barcelona, Spain
[c] Research Centre on Economics and Sustainability (ECO-SOS), Universitat Rovira i Virgili (URV), Reus, Spain
Supplemental data for this article can be accessed online at https://doi.org/10.1080/21681376.2024.2381641

with flexible and independent use of office and social space that eases direct interaction among the users for social, learning and business-related interests (Bilandzic & Foth, 2013).

CS users (coworkers) are different sorts of knowledge professionals, primarily freelancers, working with various degrees of specialisation in the vast domain of the knowledge industry (Gandini, 2015). During and after the COVID-19 pandemic, remote workers chose to work at CSs to balance the autonomy of remote work with the need for social interaction and to reduce the isolation they experienced at home (Mariotti et al., 2023c). This model has undoubtedly been enabled by the diffusion of information and communications technology (ICT), which has made it possible to experiment with different forms of remote working (Eurofound, 2022), freeing people from the need to be located in a specific place.

CSs are primarily found in large urban areas with a concentration of skilled labour, knowledge and innovation (Mariotti et al., 2017), as well as the so-called 'creative class' (Florida, 2002). The first CS, called 'Hat Factory', was founded in 2005 in San Francisco by a Silicon Valley software programmer who aimed to combine the structure and community of an office job with the freedom and independence of freelance work. CSs subsequently began to flourish in Europe, and the first CS in China (Shanghai), called 'Sanshu Salone', was opened in 2007 by a person returning from Europe (Wang et al., 2022). The CS industry grew slowly for eight years until China's state council enacted several regulations in 2014–2015 to encourage mass entrepreneurship and innovation (Luo & Chan, 2020; Wang et al., 2022). CSs were identified in this national initiative as the geographical facilitators of start-up entrepreneurship and innovation. In China's major cities, CSs have progressively emerged as a new type of spatial economic activity; this not only brings innovation to the conventional office model but also contributes to the effective use of office buildings and the long-term sustainability of office spaces (Wang et al., 2022). Papers analysing the location factors of CSs mainly refer to the location theories of the service industry (Mariotti et al., 2023a), and specifically of the creative industry (Coll-Martínez & Méndez-Ortega, 2023), as described in the next section.

With this background, the paper identifies the location factors of CSs in the Chinese capital city of Beijing by disentangling similarities and differences with the European situation – as described in the literature review – thus providing an answer to the following research questions, and filling the gap in the literature about the location patterns of CSs in urban China:

(1) Where are CSs located and what are the similarities and differences in the location determinants of large European and Chinese cities?
(2) How does the Beijing urban structure affect CS location determinants?
(3) What role do (creative industry) specialisation, variety and government facilities and incentives play in CS location?

An original georeferenced database on CSs in Beijing in 2022 is adopted and GIS mapping, descriptive statistics, and econometric analysis (count data models) are developed to reach the goal.

The paper is structured into five sections. A literature review of location factors follows the introduction, distinguishing between studies focusing on large cities in the West and China. Section three presents the case description, data and methodology. Section four describes and discusses descriptive statistics and econometric analysis. Conclusions, policy implications and future research follow.

2. LITERATURE REVIEW

The location patterns of CSs can be compared to those in the service industry (Mariotti et al., 2023a) and the creative industry (Coll-Martínez & Méndez-Ortega, 2023). Patterns in the

service industry concern: (i) the high density of business activities, used as a proxy of urbanisation and localisation economies, as well as the market size and potential; (ii) proximity to universities and research centres, used as a proxy for the availability of a skilled labour force, innovation, creativity and business opportunities; (iii) the presence of a good local public transport network, used as a proxy of the degree of accessibility; (iv) and public incentives (Coll-Martínez & Méndez-Ortega, 2023; Mariotti et al., 2023a; Mariotti & Micek, 2024; Min et al., 2023). Location patterns in the creative industry regard: (a) productive amenities: good access to clients, specialised labour, specialised firms, universities, transportation nodes and networks (airports, motorways, train stations); (b) and non-productive amenities: good access to urban amenities such as restaurants, cafes, shops; cultural and entertainment services (theatres, museums, cinemas, music and sports clubs); good environmental quality (Coll-Martinez & Mendez-Ortega, 2023; Mariotti et al., 2023a).

In recent years, researchers have shown increasing interest in the study of CSs, especially the geographies of this emerging phenomenon in different urban contexts (Hölzel et al., 2022; Mariotti et al., 2017; Mariotti et al., 2021; Mariotti et al., 2023b; Méndez-Ortega et al., 2022). Most papers analyse location patterns in large cities through quantitative analysis, and only a few studies have applied mixed methods (Fiorentino, 2019; Mariotti et al., 2017).

About Europe, several studies have been carried out on Western and Central European cities, while few studies have concerned cities further east. Research on Asia mainly focuses on China, India and Indonesia. The following sections present and discuss the similarities and differences in the location patterns of CSs in large cities in the West and China, which is the focus of the present paper.

2.1. Location patterns of CSs in large cities in Europe

Mariotti et al. (2023a) explored the location determinants of the 549 CSs in Italy in 2018. The empirical analysis concerns: (i) descriptive statistics and exploratory spatial analysis to investigate the geographical distribution of CSs and (ii) econometric analysis (zero-inflated negative binomial regression). The results confirmed that CSs favour urban areas that are knowledge-intensive places for creative people. CSs are likelier to be in municipalities with higher urbanisation economies, innovation, a higher share of skilled labour and entrepreneurial vivacity (e.g., capital cities of metropolitan areas). In addition, the analysis revealed that even suburban areas close to major cities attract CSs, as do peripheral and inner areas, albeit to a lesser extent.

Two studies focus on large Italian cities, and one compares Milan and Prague. Mariotti et al. (2017) investigated the location patterns of CSs in Milan (Italy), adopting a mixed method approach (descriptive statistics, desk research and interviews with coworking managers). They found the following main location determinants: (i) urbanisation and localisation economies, (ii) market size and potential, (iii) skilled labour force availability and business opportunities and (iv) transportation accessibility. The municipality of Milan was the first in Italy to offer incentives to coworkers to rent a desk for free at a CS in the city in the form of an annual voucher.

Likewise, Fiorentino (2019) explored the location patterns of CSs in Rome using a mixed-method approach. The interviews with stakeholders highlighted that in addition to proximity with suppliers and customers and public transport accessibility, other factors play a crucial role in CS location. The author argued that some socially-oriented CSs in Rome concentrate in poor areas, helping to address social segregation and inequalities. The author indirectly pointed out that CSs are located in areas that should meet the expectations of CSs founders. For instance, if the CS is planned to be socially oriented, a less advantageous location will be selected.

Bednář et al. (2021) explored the evolution, type and dynamics of the geographical distribution of CSs in Prague and Milan from 2015 to 2019. The results show that Prague exhibits

much less colocation with innovative infrastructure (universities and research centres) than Milan. CSs are attracted to neighbourhoods with higher concentrations of immigrants from developed nations (Western Europe, the USA and Canada). Even in Milan, gentrified neighbourhoods are more appealing, but few immigrants from wealthy nations live there. Furthermore, a shift towards the polycentric city model was evident in both cities.

Coll-Martínez and Méndez-Ortega (2023) investigated the location determinants of CSs in Barcelona (Spain). A quantitative analysis was adopted using geographical information systems (GIS) and Kd agglomeration and co-agglomeration functions. The main location determinants of CSs are: (i) proximity to the centre, where there are greater chances of meeting customers and suppliers, (ii) proximity to urban amenities and (iii) the image of the location. Moreover, they co-agglomerate with firms primarily related to the creative industries.

Di Marino et al. (2023) focused on new working spaces, including CSs, in the Helsinki metropolitan area (Finland) to understand the location factors and implications for planning. Through descriptive and GIS analysis, they analysed 86 new working spaces in Helsinki in 2019 and found that they tend to be located in neighbourhoods with good access to public transport, proximity to university campuses, and a concentration of knowledge-intensive jobs. In addition, they are mainly located in multifunctional centres in the core and sub-centre pedestrian zones.

According to a study by Stam and van de Vrande (2017) on CSs in the Netherlands, most of these spaces are located in accessible city centres and big cities, and it is not unusual for these places to be in (temporarily) abandoned buildings. In addition, research shows that 55% of coworkers reside in the city where they use CSs and most commute there by bicycle (73%) or walk (12%). The authors emphasise the resulting usefulness of CS in easing inner-city traffic congestion.

Hölzel et al. (2022) studied the location of CSs in Germany with regard to vicinity, land use and points of interest, showing that the attractiveness of CSs is influenced by the types of services nearby: they tend to be located in urban areas with a large, balanced variety of services.

Méndez-Ortega et al. (2022) explore how CSs co-agglomerate with service industries in three European Cities (Barcelona, Utrecht and Warsaw), concluding that CSs tend to co-agglomerate with Knowledge Intensive Services (KIS) and could be seen as an important node in the entrepreneurial urban ecosystem.

2.2. CSs in China and location patterns in large cities

In the last ten years, the Chinese government has encouraged the development of CSs, which were considered the facilitators of start-up firms and innovation. In Article 1 of '*Guidelines for the Development of CSs*' (Ministry of Science and Technology of People's Republic of China, 2015), the policymakers describe CSs as a crucial provider of services for early-stage entrepreneurs, including affordable workspace, social networking and resource-sharing areas. By combining innovation and entrepreneurship, online and offline, incubation and investment, CSs primarily serve to encourage entrepreneurs to use new technology, develop new products, explore new markets and establish new business models with specialised services.

Specifically, in March 2014, the capital registration system proposal from the Chinese State Council was released, it included the elimination of the minimum registered capital limit for many different types of corporations. In addition, a change to the registration process for homes and commercial properties was made, enabling 'one license for multiple sites' and 'multiple licenses at one site', thus significantly cutting the entry barriers for businesses and encouraging the expansion of start-up firms. This allowed the CSs to be registered as residences for numerous firms, thus attracting several micro-enterprises and individual entrepreneurs. Besides, the State Council issued guidance on developing CSs to Promote Public Innovation and

Entrepreneurship. This guidance requires local authorities to subsidies CSs for their rents, taxes, construction of internet infrastructure and other tools and services.

CSs were considered the spatial facilitators of start-up, entrepreneurship and innovation in the national strategy. CSs have gradually developed into a new spatial economic activity in China's main cities. They not only bring innovation to the traditional office model but also help to make use of office buildings effectively and ensure the long-term viability of office spaces (Wang et al., 2022).

The national incentives and regulations enhanced the growth of CSs in China, especially in major cities. In 2016, 4298 places were available nationwide and more than 53% received governmental subsidies; each space received an average grant of one million Yuan – about 128,000 euros – (Luo & Chan, 2020). According to a report by iResearch (2017), more than 600 CSs were established in Tier-1 cities (Beijing, Shanghai, Guangzhou and Shenzhen) in 2016, accounting for nearly 80% of the domestic CS market share. In recent years, CSs have also gradually spread to new Tier-1 cities such as Chengdu, Changsha, Hangzhou and Nanjing (Wang et al., 2022).

From 2016 to 2019, China's coworking sector was in a stage of rapid development, with an average annual growth rate of over 100%, according to the report on the country's coworking market by iMedia Research Group (Wang et al., 2022). COVID-19 negatively affected the growth of the market, dramatically slowing in 2020.

During the COVID-19 pandemic, the State Council issued another set of subsidies to sustain the operation of CSs and overcome the challenging period. Through the end of 2022, more than 2000 CSs were spread among major cities in China.

Luo and Chan (2020) state that the coworking movement in China cannot be explained by either neoliberal governance or knowledge spillover (Capdevila, 2015; Gandini, 2015), it is a complex process combining top-down and bottom-up forces to reduce unemployment and promote economic restructuring, social mobility and other social functions. In addition, local practices in China emphasise city competitiveness and talent attraction, thus promoting local micro-industrial clusters while simultaneously leading to a coalition among entrepreneurial cities, ambitious individuals, venture capitalists, real estate companies and tech giants (Luo & Chan, 2020).

Studies on CSs in China have mainly focused on: (i) CS development and analysis of the role of policy incentives (Luo & Chan, 2020); (ii) physical patterns of CSs (Chen, 2021; Pang & Zeng, 2021); (iii) management of the spaces (Zhang & Mao, 2017) and (iv) coworkers' interaction (Wang et al., 2018). In addition, several factors explain the rise of CSs in China (see Luo & Chan, 2020; and Wang et al., 2022 for an overview), including the following institutional incentives available starting in 2013: (i) simplified business registration; (ii) marketing of CSs and (iii) financial assistance (such as government guidance funds and tax breaks, financial guarantees and training programmes for entrepreneurs).

Only a few studies have explored CS location patterns, instead underlying the key influence of public policies (Wang & Zhen, 2016). Based on a literature review and qualitative analysis, Wang and Zhen (2016) investigated the spatial characteristics and influence of CSs. They identified that CSs tend to be attracted by creative clusters, business centres and innovative hubs. In addition, CSs promote social mixing and sharing through coworking, co-living, the transformation of underused spaces and innovation transfer.

Through a more detailed case study on the city of Hangzhou, Wang et al. (2022) analysed the location patterns of 301 CSs in the city, adopting a quantitative analysis. They argued that CS location is determined by the regional innovation environment, measured through the density of innovative enterprises and innovation parks within a specific distance. The second important factor is the quality of life measured by catering, recreational and medical facilities. Surprisingly, the authors found that average housing prices within 1 km of CSs do not matter.

Applying spatial statistical methods and a negative binomial regression model, Tang et al. (2019) explored the transformation of location patterns of CSs in Nanjing. Based on 305 CSs, they determined that deindustrialisation, new town projects, improvement of public transport and urban innovation networks are key factors influencing the location choices of CSs. Meng et al. (2016) identified the following three main determinants that could influence the location patterns of CSs in Beijing: (i) industrial environment, (ii) innovation environment and (iii) living facilities, thus concluding that the CSs tend to gather in certain business districts where the innovation environment is stronger.

The literature review has emphasised similarities and differences between the location determinants and dynamics of CSs in Western and Chinese cities. A key difference is represented by the government's promotion of CSs in China through significant national incentives: more than 53% of CSs received governmental subsidies, with an average of about 128,000 euros each. Another relevant aspect concerns the Beijing polycentric city structure, which impacts the CSs location patterns, as described in the following sections.

3. CASE, DATA AND METHODOLOGY

3.1. Case description

The case selected for the research is Beijing, China's capital city. The city, which has more than 21 million residents (Beijing Municipal Bureau of Statistics and NBS Survey Office, n.d), encompasses 16 urban districts (referred to as 'Qu') and a total of 331 neighbourhoods (known as 'Jiedao') as of 2022. The city is China's political, cultural, economic and scientific centre, and its development heavily depends on state policies (Wei & Yu, 2006). Regarding the role of Beijing in science and innovation, the city has the most influential universities in mainland China, e.g., Peking University and Tsinghua University, and it has established multiple leading national science parks represented by Zhongguancun Science Park, 'China's Silicon Valley' (Wei & Yu, 2006, p. 388). As a focus of the state's financial system, Beijing also housed key state financial institutions (e.g., State Committee of Finance) and the headquarters of the state-owned banks (e.g., Bank of China), located on the Finance Street.

Therefore Beijing has the basis to develop CSs and other collaborative spaces to foster knowledge sharing and transfer. In 2013, the establishment of Krypton Spaces in Zhongguancun Startup Street became the cornerstone of CSs in Beijing (Huang et al., 2020). Starting in 2015, in line with the State's strategic policy on fostering innovation and entrepreneurship and CSs, the municipal government of Beijing issued a series of policies to encourage the development of CSs with a view to innovation and entrepreneurship, e.g., Implementation Opinions of Beijing Municipal People's Government on Vigorously Promoting Mass Entrepreneurship and Mass Innovation. At the same time, Beijing's Science Cities – Zhongguancun Science City, Huairou Science City, Future Science City and Beijing Economic-Technological Development Zone – provide a favourable business environment for CS, including policy incentives and tax breaks. The following three years showed rapid development of CSs in Beijing, and the number of spaces skyrocketed to 440 in 2008 (CRECC Co-working Space Council and Haozu, 2018). The case of Beijing could therefore be viewed as an exemplar of the urban geographies of CSs in Chinese cities.

As shown in Figure 1, the urban structure of Beijing is in a transition from monocentric to polycentric. With Tiananmen as the centre, five ring roads were constructed from the city centre to the city periphery. Based on the road rings, the urban structure of Beijing could be defined as three macro areas: (i) inner city (area within the fifth ring); (ii) inner suburbs (area between the fifth and sixth rings) and (iii) outer suburbs (area outside the sixth ring). In recent decades, rapid urbanisation has reshaped the urban structure of Beijing, leading to a more dispersed pattern of development. This trend is evident in the emergence of subcentres around the sixth ring (Huang et al., 2015, 2017). However, despite this polycentric shift, the development of multiple

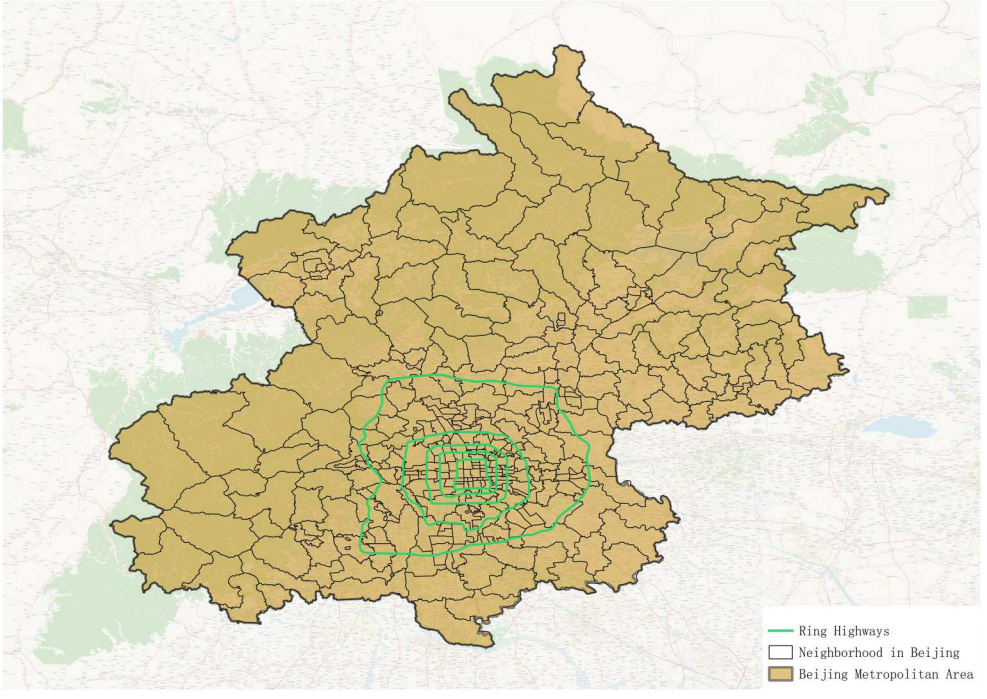

Figure 1. Urban structure of Beijing. Source: Prepared by the authors.

centres is constrained by the superior infrastructure and transportation networks characterising the city centre. Therefore, a centre-periphery structure is still obvious, as Yu and Wei (2008) noted.

3.2. Data collection

The data on CSs in Beijing in 2022 mainly comprises the geoinformation regarding location determinants. The first data set was collected from one of China's biggest workplace rental websites (shanban58).[1] By rigorously evaluating and refining the data based on size, operational model and operational scenarios, we successfully identified 372 CSs that are functioning optimally. Each CS can accommodate a maximum of 1000 people. They encompass various business types, including private CSs developed by Chinese companies like Zhonghai Office and Teccent Office, international companies such as Wework and Regus, or private owners, and those operated by public institutions. Besides offering fundamental services such as Wi-Fi, printing and meeting rooms within these spaces, many also provide business training to support startups with registration, legal consultation, advertising and human resource management.

The second dataset primarily relies on information from the Gaode Open Platform Point of Interest (POI) database[2], which has become an increasingly popular type of data for pinpointing business and government locations (Elinson & Levin, 2022; Min et al., 2023; Zeng et al., 2022). In addition, population data was collected from the Seventh Population Census in Beijing (Beijing Municipal Bureau of Statistics, 2021).

3.3. Methodology

3.3.1. Models and variables

The empirical analysis in this study centres on the neighbourhood-level placement of CSs in Beijing. The model investigates the factors influencing the distribution of CSs across each

Table 1. Description of variables.

Variable	Source	Description
CSs	Shangban58 (2021)	Number of Coworking Spaces by neighbourhood.
Population density	Beijing Municipal Bureau of Statistics (2021)	Population per km^2
Metro	Gaode POI (2021)	Number of metro stations by neighbourhood.
Universities	Gaode POI (2021)	Number of faculties by neighbourhood.
Periphery	Prepared by the authors	Dummy variable that takes a value of 1 when all neighbours are outside the sixth ring.
Incubators	Gaode POI (2021)	Number of business incubators by neighbourhood.
Gov. facilities	Gaode POI (2021)	Number of government facilities by neighbourhood.
Total creative firms	Gaode POI (2021)	Number of creative firms by neighbourhood.
Total firms	Gaode POI (2021)	Number of firms by neighbourhood.
Entropy index	Prepared by the authors	The variable that captures the creative diversity of the neighbourhood.
LQ Creatives	Prepared by the authors	Location quotient of creative firms by neighbourhood.
LQ High-tech	Prepared by the authors	Location quotient of high-tech firms by neighbourhood.
LQ Arch&Eng	Prepared by the authors	Location quotient of architecture and engineering firms by neighbourhood.

Source: Prepared by the authors.

neighbourhood. In total, 331 neighbourhoods are included in the analysis. Explanatory variables are categorised into several key groups: (i) neighbourhood type, encompassing factors such as population density, number of firms and neighbourhood location (periphery or centre); (ii) accessibility, represented by the distance from the main airport; (iii) amenities, including the presence of universities; (iv) innovation factors, such as the existence of incubators; (v) creative sector, measured by variables like creative firm presence and the entropy index; (vi) location quotients (LQ) for creative, high-tech, architecture and engineering companies and (vii) government facilities[3] (Table 1).

The empirical analysis in this study centres on the neighbourhood-level placement of CSs in Beijing; we modelled the number of CSs within a specific neighbourhood as a function of neighbourhood-specific characteristics[4]:

$$CSs_i = \beta_0 + \beta_1 PopDens_i + \beta_2 DistAirport_i + \beta_3 Universities_i + \beta_4 Incubators_i + \beta_5 GovermentFacilities_i + \beta_6 CreativeFims_{ih} + \beta_7 Entropy_i + \beta_{8j} LQ_{ij} + \mu_i$$

3.3.2. Model selection

In this paper, we employ an econometric approach using count data models (CDM) to analyse the determinants of CSs locations in Beijing.[5] Count data models are particularly suitable for our analysis due to the nature of our dependent variable, which involves counting the number of CSs in each neighbourhood. These models are well-suited for situations where the dependent variable is a count of events or occurrences, as is the case here. Using count data models, we can effectively model the relationship between the explanatory variables and the CS count, allowing us to gain deeper insights into the factors influencing CS location choices in Beijing while building on the established approach used in the European setting.

After subjecting our data to suitability tests for count data models, as outlined by Cameron and Trivedi (2013) (Table 2), we determined that the Poisson model best fits our analysis of the

Table 2. CDM test selection.

Model	N	Ll	AIC	BIC
Poisson (POI)	331	−243.2052	532.6102	554.3321
Negative binomial (NB)	331	−278.2234	542.3393	593.2134
Zero-inflated POI	331	−242.2133	535.2342	563.2234
Zero-inflated NB	331	−272.2301	549.3321	611.8211

Note: Ll (log-likelihood), AIC (Akaike information criterion) and BIC (Bayesian information criterion).
Source: Prepared by the authors.

CS distribution in Beijing. This model was selected based on its appropriateness for our dataset and ability to effectively capture the count nature of our dependent variable.

3.3.3. Spatial lag model

Our analysis incorporates a spatial lag (SLX) model to account for the fact that economic and social effects often transcend individual neighbourhoods. This model considers the influence of neighbouring areas on the CS distribution, addressing spatial dependencies. To achieve this, we include selected variables with spatial lags, reflecting the potential impact of adjacent areas on CS distribution. We rigorously validate these spatial lags by analysing spatial autocorrelation to assess their statistical significance (Moran, 1948). This approach ensures our model effectively captures spatial interactions and dependencies in the distribution of CSs in Beijing. By using first-order queen contiguity as the spatial weight matrix in the SLX model, we determine which variables to include in the spatial lag through suitability tests and economic reasoning, enhancing the robustness of our analysis and accounting for critical spatial dimensions impacting CS location choices (Wimpy et al., 2020).

Our spatial lag (SLX) model is expressed as follows:

$$\begin{aligned} CSs_i = {} & \beta_0 + \beta_1 PopDens_i + \beta_2 DistAirport_i + \beta_3 Universities_i + \beta_4 Incubators_i \\ & + \beta_5 GovermentFacilities_i + \beta_6 CreativeFims_{ih} + \beta_7 Entropy_i + \beta_{8j} LQ_{ij} \\ & + \beta_9 SL_{Goverm\,i} + \beta_{10} SL_{Entropy\,i} + \beta_{11} SL_{LQHT\,i} + \beta_{12} SL_{PopDen\,i} \\ & + \beta_{13} SL_{Creative\,i} + \beta_{14} SL_{Firms\,i} + \mu_i \end{aligned}$$

We chose the use of a spatial lag model (SLX) because it allows us to elucidate the impact of variables in neighbouring neighbourhoods on the present neighbourhoods. The selection of variables was based on three criteria: (i) socioeconomic relevance; (ii) significance in the non-spatial model; (iii) strong spatial correlation as measured by Moran's I and LISA statistics. In this context, we have included the spatial lag variable for government facilities, entropy, LQ of high-tech, population density, number of creative firms and number of firms in our model. This selection is grounded in the socioeconomic significance of the variables and aligns with our observation of a pronounced level of spatial autocorrelation among these variables.[6]

4. RESULTS

4.1. Descriptive statistics

Table 3 presents the descriptive statistics of the variables under consideration. The mean value for CSs is 0.918, indicating an average of approximately one CS per neighbourhood. However, it is noteworthy that the neighbourhood with the most CSs has 22, suggesting the presence of several neighbourhoods with no CSs. Furthermore, the location quotients (LQ) are intriguing,

Table 3. Descriptive statistics.

Variable	N	Mean	Standard Deviation	Max	Min	Range	Median
CSs	331	1.124	3.454	40	0	40	0
Population density	331	8363.613	10,380.64	40,619.9	19.64209	40,600.26	2614.207
Distance from airport	331	37.992	19.923	99.6171	0.599	99,018	33.940
Universities	331	0.278	0.760	6	0	6	0
Periphery	331	0.495	0.501	1	0	1	0
Incubators	331	0.314	1.005	8	0	8	0
Gov. Facilities	331	139.4	112.1	615	7	608	100
Total Creative Firms	331	46.40	58.82	390	0	390	24
Total Firms	331	381.0	482.5	3102	1	3101	211
Entropy Index	331	0.458	0.256	0.862	0	0.862	0.524
LQ Creatives	331	0.937	0.583	5.084	0	5.084	0.952
LQ High-tech	331	0.649	0.734	5.626	0	5.626	0.457
LQ Arch&Eng	331	1.028	0.742	7.953	0	7.953	1.032

Source: Prepared by the authors.

particularly in creative and high-tech industries. Both exhibit a mean LQ below one, signifying that, on average, these industries tend not to specialise in specific neighbourhoods. In contrast, the LQ for architecture and engineering is more than one, indicating the existence of neighbourhoods with pronounced specialisation in these fields.

Figure 2 illustrates the geographical distribution of 304 CSs in Beijing, which are distributed as follows: (i) 9.2% are situated within the second ring road; (ii) 19.4% are positioned between the second and third rings; (iii) 29.2% are located between the third and fourth rings; (iv) 21.3%

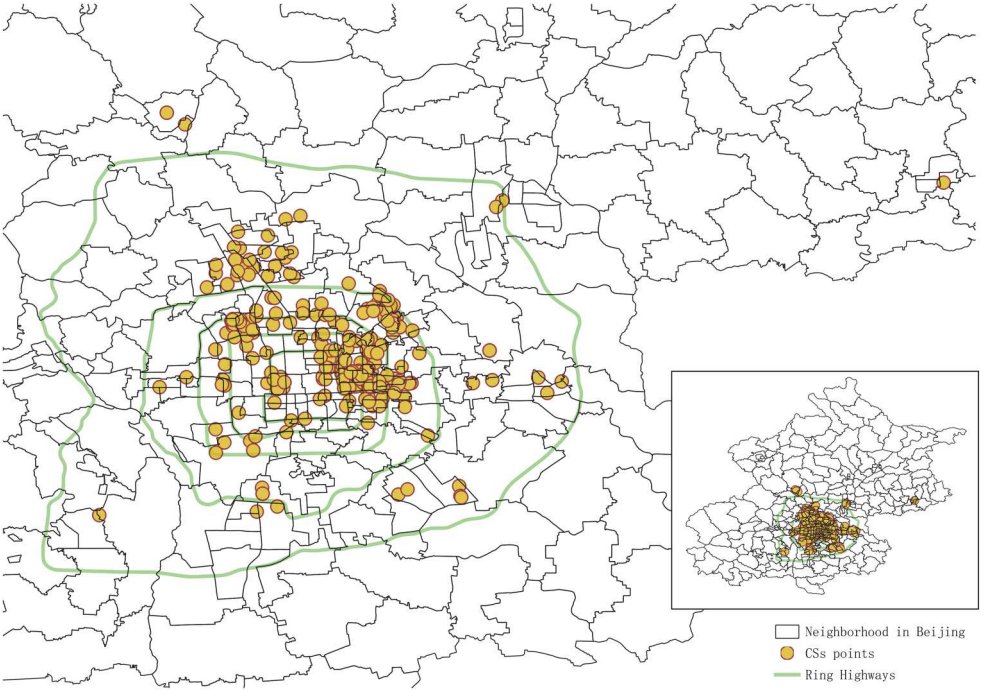

Figure 2. Location of CSs in Beijing. Source: Prepared by the authors.

are found between the fourth and fifth rings; (v) 19.0% are situated between the fifth and sixth rings and (vi) 6% are situated outside the sixth ring road. CSs in Beijing also tend to cluster within specific urban contexts, falling into five rough groups: (a) Group 1 is situated within Beijing's financial centre (Western City District); (b) Group 2 is in Beijing's central business district (Chaoyang District); (c) Group 3 is located within Beijing's education centre (Haidian District, home to Tsinghua and Peking Universities); (d) Group 4 is in Shunyi District and (e) Group 5 is in Changping District.

4.2. Econometric analysis of CS location determinants

This section presents the empirical results, shedding light on the location determinants of CSs in Beijing. The model identifies several significant factors that influence the location of CSs in the neighbourhoods. The first two columns contain the location model, not considering the spatial lag (i.e., non-spatial model; the first column samples all neighbourhoods and the second column samples only central neighbourhoods, that is those within the sixth ring) and the third column contains the spatial lag model (SLX) (Table 4).

First, for the non-spatial model, we find that the distance from the airport negatively impacts the CS location. This suggests that CSs are more likely to be situated in neighbourhoods closer to the main airport in Beijing, becoming a significant factor in the location of these spaces.

Second, the number of business incubators in each neighbourhood, primarily promoted by the public government, positively affects the CS location. This implies that CS location is driven by localisation economies. CSs tend to thrive in areas with a more significant presence of business incubators, which provide an environment conducive to entrepreneurial activities (Capdevila, 2015). The number of government offices also positively influences CS location selection, indicating that CS operators consider proximity to government institutions advantageous (Zhang et al., 2019).

Moreover, our findings reveal that both the total number of creative firms and the entropy of creative firms positively impact the location of CSs. CS operators are attracted to neighbourhoods with a higher concentration of creative firms and those with diverse creative industries. This highlights the importance of agglomeration effects as CSs seek to be part of vibrant ecosystems that foster innovation and collaboration (Capdevila, 2022). In contrast, we observe a negative relationship between the concentration/specialisation of neighbourhoods in creative activities and the presence of CSs. This suggests that while CSs prefer areas with diverse creative firms (entropy), they are less inclined to locate in neighbourhoods that are overly specialised in the creative sector. Finally, we observe an adverse effect on the location of CSs in peripheral neighbourhoods, suggesting that CSs tend to concentrate in more central and accessible locations within the city, leaving peripheral areas with a limited CS presence. This result is in line with the findings of the literature review underlying the importance for CSs to mainly locate in the core area of the city with high amenity environments (Van Oort et al., 2003): from productive amenities (e.g., good access to clients, specialised labour, specialised firms, universities, transportation nodes and networks), to non-productive amenities (e.g., good access to urban amenities such as restaurants, cafes, shops, cultural and entertainment services, good environmental quality) (Mariotti et al., 2023a).

The third column of our results shows the spatial lag model (SLX), incorporating spatial dependencies into our analysis. In this model, we observe interesting findings regarding the impact of spatial lags on the location determinants of CSs in Beijing. Notably, the lag variables of entropy and number of creative firms positively and significantly affect CS location selection. This implies that neighbourhoods are more likely to attract CSs if neighbouring areas have a high diversity of creative activity and a thriving creative industry (Coll-Martínez & Méndez-Ortega, 2023).

Table 4. Econometric results.

	(1) Poisson All Neighbourhoods	(2) Poisson Central Neighbourhoods	(3) Poisson SLX All Neighbourhoods
Number of CSs			
Population density	1.98e-05***	1.64e-05**	5.51e-06
	(7.69e-06)	(7.78e-06)	(9.16e-06)
Distance from airport	−0.323**	−0.124**	−0.135**
	(0.141)	(0.059)	(0.064)
Universities	−0.226	−0.153	−0.222
	(0.321)	(0.166)	(0.276)
Incubators	0.0843**	0.151***	0.122***
	(0.0334)	(0.0360)	(0.0380)
Government offices	0.00194***	0.00134**	0.00187***
	(0.000624)	(0.000640)	(0.000700)
Creative firms	0.00832***	0.00847***	0.00722***
	(0.000745)	(0.000717)	(0.000862)
Entropy	4.924***	4.977***	2.662***
	(0.806)	(0.839)	(0.953)
LQ Creative	−1.452***	−1.758***	−1.289***
	(0.397)	(0.420)	(0.411)
LQ High Tech	0.0276	−0.0299	0.117
	(0.0873)	(0.0903)	(0.144)
LQ Arch&Eng	−0.348	−0.0583	−0.495
	(0.258)	(0.278)	(0.585)
Periphery	−2.870***		−2.849***
	(0.630)		(0.671)
Constant	−1.668	−5.703**	−7.125**
	(2.421)	(2.890)	(3.231)
Spatial Lag Variables			
Lag government offices			0.00230
			(0.00192)
Lag entropy			2.866**
			(1.424)
LG LQ High Tech			−0.273
			(0.221)
LG Population density			−22.31**
			(11.80)
LG Creative Firms			0.00272
			(0.00537)
LG Firms			0.00129**
			(0.000672)
Observations	331	167	331
R-square	0.610	0.478	0.621
Log likelihood	−319.3	−295.8	−310.5

Notes: Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Prepared by the authors.

Furthermore, our analysis reveals a negative relationship between the lag of population density and CS location, suggesting that CSs are less inclined to locate in neighbourhoods surrounded by densely populated areas. This finding is intriguing as it indicates that while proximity to economic centres in Beijing tends to attract CSs, an excessive population density

in neighbouring areas may act as a deterrent. As shown in the map, several neighbourhoods have higher population density in the west and south, but the number of CSs is relatively low. According to Huang et al. (2017), these new subcentres have developed in the last 20 years, and the government's intention regarding urban planning was to 'organically decentralise the population' (Liu & Sun, 2020). Interestingly, the subcentres were developed to attract employment to these areas (Huang et al., 2017), but CSs show lower interest in locating there.

The role of cultural activities and their entropic impact on attracting CSs (Figure 3 and Figure 4) is noteworthy in our analysis. Notably, the diversity and vibrancy of cultural activities serve as a magnet for CSs, drawing in entrepreneurs, freelancers and creative professionals seeking an environment enriched with cultural experiences and artistic stimulation (Coll-Martínez & Méndez-Ortega, 2023). Moreover, it is worth emphasising that this relationship between cultural diversity and the CS location choice extends to the spatial dimension of urban areas. Our findings reveal a pattern in Beijing: cultural diversity tends to diminish as one moves from the city centre towards peripheral areas. This observation underscores a critical point: in many peripheral neighbourhoods, the farther one ventures from the city centre, the less diverse the cultural landscape becomes. This drop in cultural diversity as one moves away from the city centre can be attributed to Beijing's enduring centre-periphery urban structure (Yu & Wei, 2008). It is important to note that the northern regions of Beijing are predominantly rural and based on agriculture. As one ventures into these rural northern areas, the influence of the city centre diminishes, resulting in reduced cultural diversity. Additionally, suburban governance often lacks the same level of investment in cultural and social infrastructure found in urban centres, further contributing to this disparity (Hamel & Keil, 2015).

The findings show that CSs are mainly located in the inner city (within the fifth ring) and that government facilities are essential for attracting CSs, thus underlying the key role of institutional dependence. In addition, transport accessibility and the composition of the local

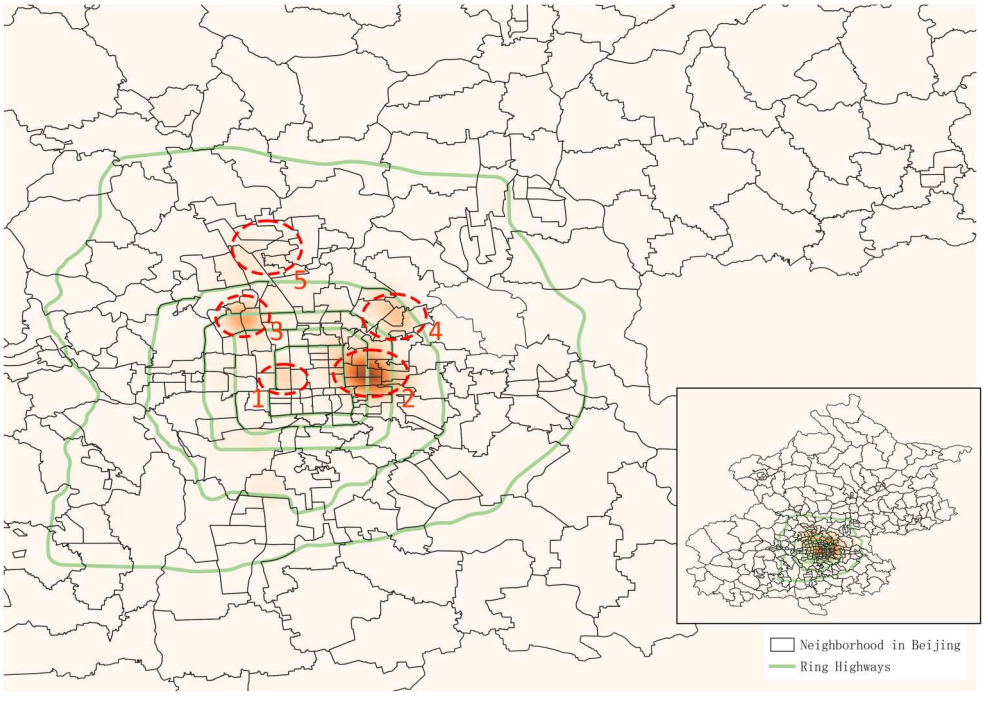

Figure 3. Groups of CSs in Beijing. Source: Prepared by the authors.

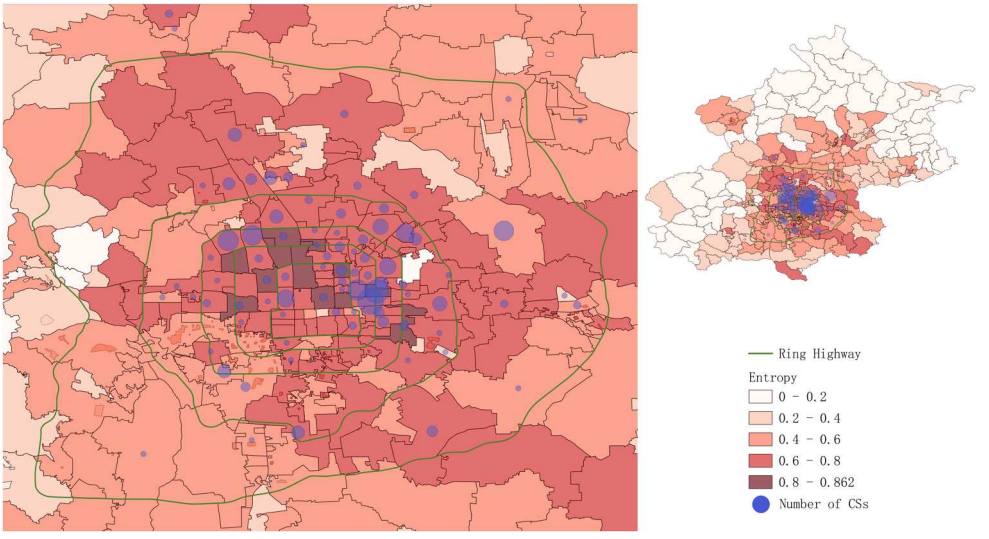

Figure 4. The relevance of entropy and the number of CSs in Beijing neighbourhoods. Source: Prepared by the authors.

creative industry ecosystem drive the CS location choice. The results also highlight the influence of spatial context: CSs are attracted to neighbourhoods with diverse creative activities (localisation economies) and high economic activity (urbanisation economies). Entropy plays a crucial role in attracting CSs, and the impact of diversity and economic activity goes beyond neighbourhood borders. The result is that in terms of creative firms, specialisation is not relevant, but diversity is. Still, caution is needed regarding nearby neighbourhoods with high population densities. These insights provide valuable knowledge for policymakers, real estate developers and CS operators, contributing to developing vibrant and collaborative urban environments.

5. CONCLUSIONS

The literature review exploring the location determinants of CSs in large European and Chinese cities shows the predominance of the typical location factors: transport accessibility, government facilities and incentives, the presence of creative industries, specialisation – proxying localisation economies – and urbanisation economies. Nevertheless, while public incentives massively promoted CS growth in Beijing and other large Chinese cities, as explored by the literature review, these policies are sporadic in Europe. Therefore the studies do not recognise them as a driver in CS locations. In Europe, institutions and governmental bodies have launched CSs as public services within public libraries, universities or schools, aiming to facilitate social cohesion, the collaboration of diverse social groups and local economic development (Mariotti et al., 2023b; Migliore et al., 2024). In a few cases, incentives have been given to coworkers to rent desks in CSs, as in the case of Milan (Mariotti et al., 2017). By contrast, since 2013, the Chinese government has incentivised CSs to accompany coworking managers and coworkers in opening and carrying out their activities, thus easing administrative interactions (e.g., simplified business registration; marketing of CSs; financial assistance) (Luo & Chan, 2020; Wang et al., 2022), thus promoting the growth of CSs in large Chinese cities. Specifically, the Chinese government considers CSs as facilitators of start-up firms and innovation thus providing a favourable business environment for them, including policy incentives and tax breaks.

Besides, government facilities and public infrastructures emerge as relevant determinants for CSs' location in Beijing, given the substantial reliance of Chinese businesses on proximity to governmental offices, public institutions and universities for efficient administrative interaction. Furthermore, government facilities in European cities are also important, but to a lesser extent. In large Western cities and Beijing, the diversity of creative industries and the specialisation of architecture and engineering activities represent essential factors for attracting CSs (Méndez-Ortega et al., 2022).

While ICT activities are crucial in Western cities, the same does not hold true in Beijing. Economic activities (urbanisation economies) remain a significant factor for both Western cities and Beijing, underscoring their universal importance in CS location selection. In addition, as in other European cities, localisation economies (e.g., the diversity of creative industries, specialisation of architecture and engineering activities) and urbanisation economies drive CS location in China. The concentration of CSs in the inner city (inside the fifth main ring) also confirms the centre-periphery urban structure of the city (Wei & Yu, 2006) and the northern peripheral regions are predominantly rural and agriculture-based and so do not attract CSs.

Moreover, our findings reveal that both the total number of creative firms and the entropy of creative firms positively impact the location of CSs. CS operators are attracted to neighbourhoods with a higher concentration of creative firms and those with diverse creative industries. This highlights the importance of agglomeration effects as CSs seek to be part of vibrant ecosystems that foster innovation and collaboration (Capdevila, 2022). In contrast, we observe a negative relationship between the concentration/specialisation of neighbourhoods in creative activities and the presence of CSs. This suggests that while CSs prefer areas with diverse creative firms (entropy), they are less inclined to locate in neighbourhoods that are overly specialised in the creative sector. Finally, we observe an adverse effect on the location of CSs in peripheral neighbourhoods, suggesting that CSs tend to concentrate in more central and accessible locations within the city, leaving peripheral areas with a limited CS presence. This analysis, therefore, sets the stage for a comprehensive examination of the distinct location preferences of CSs in Beijing compared to their counterparts in large European cities, thus filling the gap in the literature.

The results of the analysis provide some insights into the following policy implications related to the location of CSs in China. Encouraging entrepreneurship would be a logical step to sustain employment levels in an ageing society, so CSs in Beijing could be regarded as an opportunity to enhance the economic performance of large cities and less central areas. Recent studies have focused on this issue, finding that CSs in medium-sized cities, smaller towns and villages can contribute to the socioeconomic development of the local ecosystem (Biagetti et al., 2023; Vogl & Micek, 2022). CSs have attracted the attention of municipal councils and policymakers, with funding for them in some countries (Vogl & Akhavan, 2022).

However, the studies and empirical evidence about the impact of government support on the creative industries, specifically CSs, are not conclusive. Further research might focus on assessing the impact of government incentives in facilitating start-up firms and innovation, as well as creating stable, high-wage jobs. In the coming years, the office market in China is expected to expand because of large-scale office demand sparked by the growth of several new businesses (Wang et al., 2022). At the same time, the development of remote and hybrid working in the last four years has increased the demand for shared spaces and CSs to accommodate remote workers. The COVID-19 pandemic has accelerated the spread of remote work worldwide and renewed interest in peripheral and rural areas for living and working (Mariotti et al., 2023b). As stated by the ILO (2020), remote work can positively contribute to the well-being of individuals in several ways, such as conferring more autonomy and possibly a better work-life balance. CSs can represent an efficient alternative to both the home and office (Mariotti et al., 2023c).

Further research may focus on applying a mixed method approach, corroborating the results of the quantitative analysis with a qualitative study (e.g., a survey of coworking managers) to better disentangle the CS location determinants and explore the effects of these spaces on the urban local context in terms of attractiveness, local development, gentrification, etc. Moreover, distinguishing between public and private CSs will allow us to explore the community-driven or real-estate orientation. Besides, comparing CS location in other Chinese cities of different sizes will disentangle other similarities and differences, thus providing policymakers with valuable insights.

ACKNOWLEDGEMENTS

We are grateful for the comments received at the 62nd ERSA Congress.

DISCLOSURE STATEMENT

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

FUNDING

Shifu Zhang received financial support from the China Scholarship Council (grant number CSC202006160029) while studying for a PhD at the Politecnico di Milano.

NOTES

[1] https://shangban.58.com/bj/office/.
[2] https://lbs.amap.com/product/search#/.
[3] Government facilities encompass administrative offices on different levels and public institutions.
[4] The omission of rental prices in the model specification is due to data unavailability for all neighbourhoods. However, the influence of this variable is indirectly captured by other factors such as the presence of existing businesses, infrastructure availability and agglomeration economies, as suggested by Figueiredo et al. (2002).
[5] The use of count data models is supported by their widespread application in analysing business localisation patterns across diverse contexts, as evidenced by studies within logistics (Holl & Mariotti, 2018), urban creative industries (Coll-Martínez & Arauzo-Carod, 2017) and coworking space localisation at various scales (Méndez-Ortega et al., 2024; Mariotti et al., 2021).
[6] Check Figure A1 in the Appendix (in the online supplemental data) to see the local indicator of spatial association and Moran Index for selected SLX variables.

ORCID

Shifu Zhang http://orcid.org/0000-0002-8645-8551
Ilaria Mariotti http://orcid.org/0000-0001-8034-6914

REFERENCES

Avdikos, V., & Kalogeresis, A. (2016). Socio-Economic profile and working conditions of freelancers in Coworking spaces and work collectives: Evidence from the design sector in Greece. *Area*, *49*(1), 35–42. https://doi.org/10.1111/area.12279

Bednář, P., Mariotti, I., Rossi, F., & Danko, L. (2021). The evolution of coworking spaces in milan and Prague: Spatial patterns, diffusion, and urban change. In M. Orel, O. Dvouletý, & V. Ratten (Eds.), *The flexible workplace. Coworking and other modern workplace transformations* (pp. 59–78). Springer.

Beijing Municipal Bureau of Statistics. (2021). *Main data of the seventh national population census of Beijing municipality.* Retrieved December 2021, from https://tjj.beijing.gov.cn/zt/bjsdqcqgrkpc/qrpbjjd/202105/t20210519_2392982.html.

Beijing Municipal Bureau of Statistics and NBS Survey Office in Beijing. (n.d). https://tjj.beijing.gov.cn/EnglishSite/.

Biagetti, M., Mariotti, I., Rossi, F., & Scicchitano, S. (2023). The surge of remote working and coworking spaces. Exploring the case of Italy through mixed methods, Working paper.

Bilandzic, M., & Foth, M. (2013). Libraries as coworking spaces: Understanding user motivations and perceived barriers to social learning. *Library Hi Tech*, *31*(2), 254–273. https://doi.org/10.1108/07378831311329040

Cameron, A. C., & Trivedi, P. K. (2013). *Regression analysis of count data* (Vol. 53). University Press.

Capdevila, I. (2013). Knowledge dynamics in localized communities: Coworking spaces as microclusters. Available at SSRN: https://ssrn.com/abstract=2414121.

Capdevila, I. (2015). Co-working spaces and the localised dynamics of innovation in Barcelona. *International Journal of Innovation Management*, *19*(03), 1540004. https://doi.org/10.1142/S1363919615400046

Capdevila, I. (2022). Building communities in rural coworking spaces. In V. Mérindol, & D. Versailles (Eds.), *Open labs and innovation management: The dynamics of communities and ecosystems* (pp. 146–168). Routledge.

Chen, W. (2021). Coworking spaces in China: Developing a new strategy of reusing industrial heritage properties under sharing economy. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *46*, 117–123. https://doi.org/10.5194/isprs-archives-XLVI-M-1-2021-117-2021

Coll-Martínez, E., & Arauzo-Carod, J. M. (2017). Creative milieu and firm location: An empirical appraisal. *Environment and Planning A*, *49*(7), 1613–1641. https://doi.org/10.1177/0308518X17702646

Coll-Martínez, E., & Méndez-Ortega, C. (2023). Agglomeration and coagglomeration of co-working spaces and creative industries in the city. *European Planning Studies*, *31*(3), 445–466. https://doi.org/10.1080/09654313.2020.1847256

CRECC Co-working Spaces Council and Haozu. (2018). *Diversity and concentration, co–working market research report* 2018. Retrieved December 2022, from https://baijiahao.baidu.com/s?id = 1621089551081401325&wfr = spider&for = pc.

Elinson, R., & Levin, N. (2022). An analysis of Amud Anan-A unique volunteered geographic information platform for nature-based recreation in Israel. *Applied Geography*, *148*, 102791. https://doi.org/10.1016/j.apgeog.2022.102791

Eurofound. (2022). *Working conditions in the time of COVID-19: Implications for the future, European working conditions telephone survey 2021 series*. Publications Office of the European Union.

Figueiredo, O., Guimarães, P., & Woodward, D. (2002). Home-field advantage: Location decisions of Portuguese entrepreneurs. *Journal of Urban Economics*, *52*(2), 341–361. https://doi.org/10.1016/S0094-1190(02)00006-2

Fiorentino, S. (2019). Different typologies of 'co-working spaces' and the contemporary dynamics of local economic development in Rome. *European Planning Studies*, *27*(9), 1768–1790. https://doi.org/10.1080/09654313.2019.1620697

Florida, R. (2002). *The rise of the creative class: And how it's transforming work, leisure, community and everyday life*. Basic Books.

Gandini, A. (2015). The rise of coworking spaces: A literature review. *Ephemera: Theory & Politics in Organization*, *15*(1), 193–205. https://ephemerajournal.org/sites/default/files/2022-01/15-1gandini.pdf.

Gaode POI. (2021). Gaode map open platform point of interest. Retrieved December 2021, from https://lbs.amap.com/product/search#/.

Hamel, P., & Keil, R.2015). *Suburban governance: A global view*. University of Toronto Press.

Holl, A., & Mariotti, I. (2018). The geography of logistics firm location: The role of accessibility. *Networks and Spatial Economics*, *18*(2), 337–361. https://doi.org/10.1007/s11067-017-9347-0

Hölzel, M., Kolsch, K.-H., Vries, W. T. d., & Chair, M. (2022). Location of Co-working spaces (CWSs) regarding vicinity, land use and points of interest (POIs). *Land*, *11*(3), 354. https://doi.org/10.3390/land11030354

Huang, H., Liu, Y., Liang, Y., Vargas, D., & Zhang, L. (2020). Spatial perspectives on coworking spaces and related practices in Beijing. *Built Environment*, *46*(1), 40–54. https://doi.org/10.2148/benv.46.1.40

Huang, D., Liu, Z., & Zhao, X. (2015). Monocentric or polycentric? The urban spatial structure of employment in Beijing. *Sustainability*, *7*(9), 11632–11656.

Huang, D., Liu, Z., Zhao, X., & Zhao, P. (2017). Emerging polycentric megacity in China: An examination of employment subcenters and their influence on population distribution in Beijing. *Cities*, *69*, 36–45.

ILO. (2020). Defining and measuring remote work, telework, work at home and home-based work. ILO policy brief [online]. Retrieved December 2021, from https://ilostat.ilo.org/topics/employment/.

iResearch. (2017). China co-working industry research report. Retrieved December 2021, from https://report.iresearch.cn/report/201708/3042.shtml.

Liu, F., & Sun, W. (2020). Impact of active "organic decentralization population" policy on future urban built-up areas: Beijing case study. *Habitat International*, *105*, 102262. https://doi.org/10.1016/j.habitatint.2020.102262

Luo, Y., & Chan, R. C. (2020). Production of coworking spaces: Evidence from Shenzhen, China. *Geoforum*, *110*, 97–105. https://doi.org/10.1016/j.geoforum.2020.01.008

Marino, M. D., Rehunen, A., Tiitu, M., & Lapintie, K. (2023). New working spaces in the Helsinki metropolitan area: Understanding location factors and implications for planning. *European Planning Studies*, *31*(3), 508–527. https://doi.org/10.1080/09654313.2021.1945541

Mariotti, I., Akhavan, M., & Rossi, F. (2021). The preferred location of coworking spaces in Italy: An empirical investigation in urban and peripheral areas. *European Planning Studies*, 1–23.

Mariotti, I., Akhavan, M., & Rossi, F. (2023a). The preferred location of coworking spaces in Italy: An empirical investigation in urban and peripheral areas. *European Planning Studies*, *31*(3), 467–489. https://doi.org/10.1080/09654313.2021.1895080

Mariotti, I., Capdevila, I., & Lange, B. (2023b). Flexible geographies of new working spaces. *European Planning Studies*, *31*(3), 433–444. https://doi.org/10.1080/09654313.2023.2179232

Mariotti, I., Di Marino, M., & Bednar, P. (Eds.) (2023c). *The COVID-19 pandemic and future of working spaces*. Routledge. https://doi.org/10.4324/9781003181163.

Mariotti, I., Di Vita, S., & Akhavan, M. (2021). *New workplaces–location patterns, urban effects and development trajectories*. Springer International Publishing.

Mariotti, I., & Micek, G. (2024). Theoretical framework of the location of coworking spaces. In I. Mariotti, E. Tomaz, G. Micek, & C. Mendez-Ortega (Eds.), *Evolution of New working spaces: Changing nature and geographies* (pp. 73–82). Springer.

Mariotti, I., Pacchi, C., & Di Vita, S. (2017). Co-working spaces in Milan: Location patterns and urban effects. *Journal of Urban Technology*, *24*(3), 47–66. https://doi.org/10.1080/10630732.2017.1311556

Méndez-Ortega, C., Micek, G., & Malochleb, K. (2022). How do coworking spaces coagglomerate with service industries? The tale of three European cities. *Cities*, *130*, 103875. https://doi.org/10.1016/j.cities.2022.103875

Méndez-Ortega, C., Smit, M. J., & Micek, G. (2024). Location patterns and drivers of coworking spaces in European regions. *Tijdschrift Voor Economische en Sociale Geografie*, *115*, 281–301. https://doi.org/10.1111/tesg.12603

Meng, G., Lv, L., & Huang, R. (2016). The characteristics of location selection and influencing factors of "maker-space" in Beijing (北京"众创空间"区位选择特征及影响因子分析). *Journal of Capital University of Economics and Business*, *18*(5), 89–97.

Migliore, A., Tagliaro, C., Schaumann, D., & Hua, Y. (Eds.). (2024). University hubs: Hybrid spaces between campus, work, and social spaces. In I. Mariotti, E. Tomaz, G. Micek, & C. Mendez-Ortega (Eds.), *Evolution of new working spaces: Changing nature and geographies* (pp. 47–58). Springer.

Min, M., Li, H., Ma, T., & Miao, C. (2023). Will agricultural land scale management aggravate non-point source pollution?– Chaohu Lake Basin, China as a case study. *Applied Geography*, *158*, 103056. https://doi.org/10.1016/j.apgeog.2023.103056

Ministry of Science and Technology of the People's Republic of China. (2015). *The guidelines of the development of coworking spaces*. Retrieved December 2021, from https://www.gov.cn/zhuanti/2015-12/14/content_5023530.html.

Moran, P. A. P. (1948). The interpretation of statistical maps. *Journal of the Royal Statistical Society. Series B*, *10* (2), 243–251. https://doi.org/10.1111/j.2517-6161.1948.tb00012.x

Moriset, B. (2011). Developing the digital economy in French rural regions? *Netcom. Réseaux, Communication et Territoires*, *25*(3/4), 249–272. https://doi.org/10.4000/netcom.175

Pang, X., & Zeng, J. (2021). Furniture design for Co-working space (面向联合办公空间的家具设计研究). *Packaging Engineering*, *42*(14), 212–218.

Shangban58. (2021). *Coworking spaces in Beijing*. Retrieved December 2021, from https://shangban.58.com/bj/office/.

Spinuzzi, C. (2012). Working alone together: Coworking as emergent collaborative activity. *Journal of Business and Technical Communication*, *26*(4), 399–441. https://doi.org/10.1177/1050651912444070

Stam, E., & van de Vrande, V. (2017). Solopreneurs and the rise of co-working in The Netherlands. In *Entrepreneurial Neighborhoods* (pp. 65–79). Edward Elgar Publishing.

Tang, K., Zhai, G., He, Z., & Gu, F. (2019). The study on the spatio-temporal distribution patterns and evolution mechanism of makerspace in Nanjing （南京市众创空间时空分布格局及演化机制研究). *Modern Urban Research*, *8*(4), 52–59.

Van Oort, F., Weterings, A., & Verlinde, H. (2003). Residential amenities of knowledge workers and the location of ICT-firms in The Netherlands. *Tijdschrift Voor Economische en Sociale Geografie*, *94*(4), 516–523. https://doi.org/10.1111/1467-9663.00278

Vogl, T., & Akhavan, M. (2022). A systematic literature review of the effects of coworking spaces on the socio-cultural and economic conditions in peripheral and rural areas. *Journal of Property Investment & Finance*, *40*(5), 465–478.

Vogl, T., & Micek, G. (2022). Why do they go to the peripheries? Studying the relations between the real estate market and coworking spaces in the peripheral areas of Germany. *Journal of Property Investment & Finance*, *40*(5), 479–492. https://doi.org/10.1108/JPIF-11-2021-0095

Wang, W., Liang, J., & Niu, J. (2022). Site selection of Co-working spaces under the influence of multiple factors: A case study in Hangzhou, China. *Sustainability*, *14*(5), 2676. https://doi.org/10.3390/su14052676

Wang, L., Shi, L., & Xin, X. (2018). Exploration of co-working user experience based on value opportunity theory (基于价值机会理论的联合办公用户体验探究). *Packaging Engineering*, *39*(20), 7.

Wang, J., & Zhen, F. (2016). Spatial characters and planning strategy for mass innovation space (城市众创空间的特征、机制及其空间规划应对). *Planners*, *32*(9), 26–32.

Wei, Y. D., & Yu, D. (2006). State policy and the globalization of Beijing: Emerging themes. *Habitat International*, *30*(3), 377–395. https://doi.org/10.1016/j.habitatint.2004.10.002

Wimpy, C., Whitten, G., & Williams, L. (2020). X marks the spot: Unlocking the treasure of spatial-X models. *The Journal of Politics*, *83*(2), 722–739. https://doi.org/10.1086/710089

Yu, D., & Wei, Y. D. (2008). Spatial data analysis of regional development in greater Beijing, China, in a GIS environment. *Papers in Regional Science*, *87*(1), 97–119. https://doi.org/10.1111/j.1435-5957.2007.00148.x

Zeng, J., Yue, Y., Gao, Q., Gu, Y., & Ma, C. (2022). Identifying localized amenities for gentrification using a machine learning-based framework. *Applied Geography*, *145*, 102748. https://doi.org/10.1016/j.apgeog.2022.102748

Zhang, Y. M., & Mao, J. Y. (2017). Study on the innovation and growth strategy of Co-working space business model (共享办公空间商业模式创新及成长策略研究). *Science & Technology Progress and Policy*, *34*(17), 1–8.

Zhang, M., Zhang, J., & He, H. (2019). Research on the formation mechanism of urban maker space cluster based on synergy theory: Taking Hangzhou as an example (基于协同理论的城市创客空间集群形成机制研究:以杭州为例). *Urban Development Research*, *26*(7), 29–36.