Collective Innovation Spaces in Shanghai
- spatial patterns and social life

By

Haijing Liu

Submitted to the Department of Urban Studies and Planning
on May 14, 2018, in partial fulfillment of the
requirements for the degree of
Master in City Planning

Abstract

In 2014, the Chinese central government began an initiative - “mass innovation and entrepreneurship” – as its new strategy of economic development. Collective innovation spaces were promoted as the physical manifestation to fuel this economic development strategy. As a result, the establishment of collective innovation spaces has since received significant funding from both the public and the private sector. The number of collective innovation spaces has grown exponentially over the years. With this significant growth rate, collective innovation spaces have started to exhibit a distinctive spatial pattern and made an impact on urban life. However, few systematic studies have been carried out to understand this spatial pattern and the mechanisms behind it.

This thesis takes Shanghai as the study site. Using statistical model and spatial analysis, the study identifies several clusters of collective innovation spaces (CIS) in Shanghai as well as their spatial characteristics. It demonstrates that rental housing units, IT companies, universities, restaurants, bars and coffee shops have a positive relationship with CIS clusters. However, housing developments and parks have a negative relationship with CIS clusters. Development of CIS and the thriving third places, which are privatized social spaces other than home and workspaces, generate an innovation network that facilitates social interactions, innovation, and entrepreneurship. It represents a new kind of urban development in China, integrating, connecting and preserving the existing urban fabric. Furthermore, by investigating in two case studies in Shanghai, the thesis gives policy and design suggestions on the development of CIS clusters.

Keywords: Collective innovation spaces; cluster; urban development; Shanghai;
Acknowledgments

The two years at MIT have been an eye-opening journey to me.

My sincere thanks to the members of my committee: to Professor Dennis Frenchman, your encouragement and insights have made my thesis experience an inspiring experience. To Professor Siqi Zheng, thank you for your thought-provoking conversations during research meetings, and your life guidance has enriched my time at MIT. To Andrea Chegut, you are the one who brought me to the academic world of studying innovation spaces; thank you for your passion and also patience guiding me through my thesis prep experience.

Thank you to Professor Brent Ryan, for your support in helping me during the initial stage of my thesis.

Thank you to my family for always supporting me. This accomplishment would not have been possible without you. Thank you to my DUSP family: Chester, Daya and Pim for being constant supporter and laughter.

To Yin, whose humor and support have been an unending source of consolation and encouragement.
# Contents

Chapter 1 Introduction .................................................................................................................... 9

1.1 Why collective innovation spaces? – Incentives for the Chinese government and its theoretical background.............................................................................................................. 10

1.2 Literature review and research questions............................................................................. 14

Chapter 2 Understand CIS clusters in Shanghai ......................................................................... 19

2.1 Identify CIS clusters in Shanghai ....................................................................................... 19

2.1.1 Data ................................................................................................................................... 19

2.1.2 Identify CIS cluster ........................................................................................................... 20

2.2 Conceptual framework for cluster analysis........................................................................... 24

2.2.1 Literature review ............................................................................................................. 24

2.2.2 Historical context ........................................................................................................... 25

2.2.3 Survey Results ............................................................................................................... 32

Chapter 3 Evaluating CIS clusters from six criteria ..................................................................... 34

3.1 Six criteria ............................................................................................................................ 34

3.2 Statistical model .................................................................................................................. 35

3.2.1 Connectivity ................................................................................................................... 42

3.2.2 Affordable housing ......................................................................................................... 43

3.2.3 Social Spaces ................................................................................................................ 44
3.3 Case studies.......................................................................................................................... 47

3.3.1 Building typology ........................................................................................................ 48

3.3.2 Walkability................................................................................................................... 50

3.3.3 Innovation environment .......................................................................................... 54

3.3.4 Urban development models ........................................................................................ 59

Chapter 4 Conclusion............................................................................................................. 67

References............................................................................................................................. 69

Appendix 1............................................................................................................................ 74

Appendix 2............................................................................................................................ 78
Chapter 1 Introduction

In the year 2015, Chinese central government coined a new term: “Collective Innovation Spaces” (CIS) as a new measure to promote innovation and entrepreneurship. The term CIS includes coworking spaces, makerspaces, hackerspaces and innovation centers, which are platforms that support and facilitate innovation and entrepreneurship activities. Since then, the number of CIS has increased exponentially. Before 2015, there were only 50 CIS in China. However, the number of CIS grew to 2,300 in 2015 and reached 4,000 in 2016. This rapid growth has become a phenomenon that many urban design projects and master plans are using CIS as a justification and promotion for their design strategy. However, few studies have looked into this phenomenon from the perspective of the built environment in China.

This thesis is one of the first attempts to investigate collective innovation spaces as an urban phenomenon in China. The study selects Shanghai as the study site because of its unique economic and cultural status among other Chinese cities. Using interviews, surveys, and statistical spatial modeling, this research provides solid evidence to show that the balance between housing, workspaces and social spaces are essential to the clustering of CIS in Shanghai. Existing industries have the largest impact in predicting the clustering of CIS, followed by accessibility to social spaces. Accessibility to rental units has a positive effect on CIS cluster, while accessibility to owner-occupied housing has negative effects. CIS clusters also

1 Data source: pedata.cn

9
tend to locate around IT companies and universities with a focus on related industries. However, research institutions do not have any significant impact on CIS clusters. The statistical model, along with case studies demonstrate that the privatized public spaces, connecting with CIS clusters are generating nested social spaces in the city, which becomes an essential component to the innovation network. However, parks and plaza are not a preference for CIS developers. This thesis also describes how the rapidly emerging CIS have been shaping the current built environment.

The rest of the thesis is organized as follows: the remaining of this chapter will introduce the background of this thesis. Chapter two identifies CIS clusters in Shanghai and introduces the methodology and conceptual framework of this thesis. Chapter three identifies six criteria based on chapter two and using statistical models and case studies to investigate the relationship between built environment and the clustering of CIS, how specific CIS clusters are performing regarding life quality and innovation environment. Chapter four concludes the findings and limitations in this thesis.

1.1 Why collective innovation spaces? – Incentives for the Chinese government and its theoretical background

China saw an economic boom from the 1990s till the early 2010s, where it became the “manufacturer of the world.” However, such economic development has caused severe environmental externalities, including air, water, and soil pollution. The severity of environmental problems has raised concerns from around the globe, as well as its urban residents, especially after the smog crisis in 2013 in Beijing. To establish legitimacy in being a one-party system and regain trust from its rising middle-class, the central government has had to
make progressive steps in tackling pollution issues (Zheng & Kahn, 2017). Except for environmental problems, the central government is also concerned about the slowdown of economic growth. Since 2011, China has seen a gradual decrease in annual GDP growth rate (Figure 1-1).

The central government considers entrepreneurship and innovation as the solution to address both environmental crisis and economy slowdown, which is also a typical post-industrial economic development strategy around the globe (Kunzmann, 2012). Many developed countries have transformed from manufacture-based to service-based economy. However, recognizing that the economic multiplier from service industries is relatively low, it has become a trend to promote knowledge-based urban developments (Yigitcanlar, 2010). This consideration has its roots in literature. In Birch’s study (Birch, 1981), empirical evidence suggests that the most significant job increase and successful urban growth happens where it has “the highest rates of innovation and failure.” Baumol (Baumol, 2008) argues that “entrepreneurship stimulates economic growth by putting innovation to work,” and the profit incentive constantly encourages entrepreneurs to innovate through intense market competition. Thus, entrepreneurs are critical to economic growth. It is widely believed that innovation will help China in the mass transition
from heavy-pollution manufacturing to more advanced and cleaner industries from two aspects (Zheng & Kahn, 2017). First, innovation will generate more high-tech companies and spin-off for old industries. Second, innovation in clean energy and manufacturing process can lower the cost of pollution. Therefore, innovation helps with economic growth, as well as environmental issues.

However, there is a perception hurdle for entrepreneurship rooted in Chinese culture, which prohibits the mass population from opening startups. Therefore, the central government used mass media and policy documents to state that entrepreneurship and innovation should and will be the new engine of China’s economy, and entrepreneurs will be the future of China. In the 2014 Summer Davos Forum, prime minister Li Keqiang made a national call to encourage “mass innovation and entrepreneurship.” Soon after that, during the State Council executive meeting in January 2015, he introduced “Collective Innovation Spaces” as the physical platform to support “mass innovation and entrepreneurship.” The term CIS does not have an absolute definition, but mostly it refers to entrepreneurial service platforms that provide physical spaces, facilities, and professional services for startups and entrepreneurs. CIS took the form originated from the U.S, where they are more well known as coworking spaces, makerspaces, incubators, startup cafés and so on. The term CIS encompasses all these terms together.

---

2 Merchants as an occupation has been undemined in the mainstream culture. Chinese market was dominated by state-owned enterprises since 1949. It is not until 1990s that private companies emerge because of the open reform.
In China, policy suggestions from the central government play a critical role in local governments’ decision making and also the interest of the capital market. Since the national call of “mass innovation and entrepreneurship”, local governments have offered a substantial amount of financial support to CIS, including financial subsidies and tax incentives. The capital market has also made a considerable investment in CIS, which increased by two times in the year 2016. For urban study researchers, it is important to document this new trend of urban development, to understand its underlying mechanism and to evaluate its impact on urban life.

For instance, “firms that meet the specific requirements can get subsidies of RMB 500 per square meter for three consecutive years. Firms categorized as the province or state-level CIS, are eligible for lump sum subsidies of 500,000 to one million RMB.” – China Tech Insights

---

Figure 1-2 The timeline of CIS growth in China from 2014 to 2017
1.2 Literature review and research questions

Existing literature has introduced the theoretical background of the importance of proximity for industrial activities. This review of literature begins with the agglomeration theory in the regional scale. The Marshall-Arrow-Romer (MAR) theory (Glaeser et al., 1992) argues that the geographic concentration of industry will facilitate knowledge spillovers between firms and hence, facilitate industry and city growth. Generating from Marshallian's industrial district idea, Porter conceptualizes the clustering of industrial activities and the locational competitive advantages (Porter, 2000). Firms tend to seek proximity to an established industrial cluster to employ the inventory that has already been present at that location. However, with the newly emerging industries, the evolvement of the internet, and the trend of interdisciplinary crossover specific sectors, the traditional agglomeration idea has continuously been challenged. Glaeser and his coauthors (Glaeser et al., 1992) examined three growth theories: Marshall-Arrow-Romer (MAR), Porter and Jacobs. Their findings align with Jacobs' theory, contradictory with MAR, and mixed with Porter. They argue that the diversity of industries, rather than the monopoly facilitates knowledge spillover and thus, expedites the growth of industries and increases job employment. Audretsch and Feldman (Audretsch & Feldman, 1996) further examined the underlying propensity for the agglomeration theory; they find out that innovative activities tend to cluster more in industries that knowledge spillover is relatively more critical.

Many other scholars introduced several other dimensions of the traditional cluster and agglomeration theory on a more intimate scale. Feldman introduced the time dimension of industrial agglomeration. The paper suggests that the condition of a place has a cumulative effect that provides resources and expertise considered as the industrial heritage that "might constitute
the basis for innovation, technical advance, and sustainable competitive advantage” (Audretsch & Feldman, 1996). Feldman argues against the traditional emphasis on financial incentives, but the ability of policymakers to translate underlying potential and to be aware of conditions that support entrepreneurship plays a more important role as innovation has allowed industries to grow out of its traditional segment and types. She also criticizes the wasteful government expenditures based on the cluster theory. Certain places facilitating “close contact and exchanging ideas” will be more efficient in generating economic growth and social values (Feldman & Choi, 2015). As Feldman has stated the importance of close contact to the success of entrepreneurship and innovation, Uzzi further argues that it is the social interactions between people rather than the physical closeness that contribute to knowledge spillover (Uzzi, 1999). It is more so in the case of China as building relationships (“guanxi”) is a huge component of business success (Su & Littlefield, 2001). Thus the relational proximity is more important than physical proximity (Wang & Loo, 2017). Saxenian also provides alternatives for cluster theory by emphasizing the importance of social networks and collaboration in the innovation-based economy (Saxenian, 1994). These theories, in large part, facilitate the growth of innovation spaces such as coworking spaces in the US and Europe.

Coworking offices can be seen as “microclusters” of small businesses, entrepreneurs, and freelancers where intensive knowledge transfer takes place (Capdevila, 2014).

Capdevila argues that coworking spaces as innovation networks have been replacing the traditional industrial clusters (Capdevila, 2013). In many coworking spaces, large companies act as anchor institutions to attract startups or SMEs. Capdevila (Capdevila, 2014) categorizes
coworking spaces into three types based on their collaboration models: cost-related collaboration, resource-based collaboration, and relational collaboration. For each collaboration model, Capdevila has associated characteristics in structural dimension, cognitive dimension and support and collaboration activities to them. In this sense, coworking spaces act as the platform for social networks and circulation of information that “leads to valuable outcomes (Gandini, 2015).”

With the theories mentioned above, there is a shift in urban lifestyle in Chinese cities, where spaces for social interactions come back to play a more critical role in the urban economy, built environment and everyday life. However, few research documents or studies this transformation, which lead to three research questions in this thesis:

1. Where do collective innovation spaces (CIS) cluster?

   The existence and sense of community is the core of collective innovation spaces, and the value of this community exists within a social and innovation network. Social events, lectures, pitches and so on take place in spaces such as the lounge or the common area inside CIS, which are essentially the platform and hub for social interactions, innovation, and entrepreneurship. These platforms and hubs become the connection nodes in the innovation network. Hence spatial proximity becomes the key to the viability of this innovation network. The more innovation spaces one CIS can have proximity to, the larger innovation network this CIS resides in, which gives the users in these spaces more potential to excel and innovate. Thus, this thesis first identifies the CIS clusters in the city.

2. What are the critical urban amenities for CIS clusters?
Although many scholars have indicated the importance of certain urban amenities to creative industry, there have been few empirical studies carried out in Chinese cities to examine these theories. On the other hand, more and more cities embrace the idea of innovation districts or knowledge-based urban development in either urban redevelopment or new town planning projects. Without an accurate understanding of the mechanism underlying the innovation ecosystem, the buzzwords are merely used as a title to gain central government's support and brand projects to the mass media. Thus, this thesis is one of the first attempts to draw conclusions from both existing literature and current practices in CIS and shed light on the design and planning of knowledge-based urban development in China.

3. What are the implications of CIS clusters for the built environment and urban life?

After 1949, Chinese cities experienced a series of urban development projects which were designated by the central government according to its economic and political goals at that time. The three major urban development projects are danwei, high-tech development zones, and creative industry clusters. These urban development projects play a significant role in shaping citizens' public life across Chinese cities. Therefore, it is worth examining social and political implications for this emerging urban development model and being aware of its impact on people from various backgrounds and social status.
This thesis will use Shanghai as the site to investigate. According to data from Ctoutiao\textsuperscript{4}, Shanghai ranks the 1st at the number of investment firms, 3rd for number of startup companies and 4th for the number of CIS. The first makerspace in China was founded in Shanghai in 2010. Right now, there are over 20 major CIS operators in Shanghai, diversified with different business model and user groups. The world industrial leader in coworking space, Wework, has recently acquired a local coworking brand in Shanghai. Therefore, it is a heated CIS market in Shanghai where competition is intensive.

\textsuperscript{4} By far, Ctoutiao has the most complete data on collective innovation spaces, startups, and investment firms. It has also received official recognition.
Chapter 2 Understand CIS clusters in Shanghai

Chapter two has two parts. The first part uses data collected from online sources to construct spatial statistical models to obtain a general idea about the spatial pattern of CIS in Shanghai. The second part looks into literature, historical context and survey results to build the conceptual framework for the evaluation of CIS clusters.

2.1 Identify CIS clusters in Shanghai

2.1.1 Data

Data used in this thesis comes from multiple online sources. The primary dataset for CIS is from Ctoutiao, which has 716 entries with name and address. Among the 716 entries, some items are missing while some items do not fit into the definition of CIS. Thus, the author took four steps to examine the dataset. First, entries of high-tech development zones, tech-parks, creative industrial clusters, and office parks are eliminated because it does not suit the definition of collective innovation spaces in this thesis. Second, from site visits, the author found out that some places that listed as CIS on the website do not function as CIS defined by the central government. Thus, from the naming, the author was able to eliminate these items from the list. Third, there are some missing locations from chain CIS brands, such as people squared, fttown, and so on. The author went to each of these chain brands’ website and scraped all the locations down to add to the list.
Finally, the list does not include transnational coworking brands such as WeWork. The author further added those items to the list to finalize it as a cleaned and complete CIS dataset for Shanghai, which ends up at 361 items with name, geolocations, and brand. Because of the limited available attributes, the author also looks into some other open data source for commercial office rents and tried to match with the CIS list. There are 14,924 entries scraped from ma3⁶ with five attributes and 182 entries scraped from Parkmap⁷ with ten attributes. The author was only able to obtain 86 items with floor level, building type, rents, vacancy rate, floor area and available amenities associated.

The author aggregated the 86 items and came up some general findings. 48% of CIS locate in class A commercial office buildings; 21% of CIS locate in office parks; 16% of CIS locate in class B commercial office buildings. The average vacancy rate is 36%. Rent ranges from 500 RMB/desk/month to 5,290 RMB/desk/month, with an average of 1,769 RMB/desk/month.

2.1.2 Identify CIS cluster

Two different methods are used to identify CIS clusters. The first method is kernel density estimation. The advantage of using kernel density estimation as the first step is because no model specification is needed. As there is limited knowledge in the methodology to identify spatial pattern of CIS clustering, kernel density estimation gives the first estimation and look for the cluster pattern. In addition, all other parametric or non-parametric density estimation methods are

---

⁶ An online web platform for commercial office listing  
⁷ Another online web platform for CIS
close to kernel methods. Employing the kernel density method in ArcGIS, the result identifies several hotspots in the city (see Figure 2-1). However, using this method, the author only gets a vague sense of the clusters’ spatial distribution. Kernel density estimation does not give a clear boundary. Therefore it is hard to code each CIS to identify whether they are in or not in a cluster. However, this first step gives a good sense of the spatial pattern of CIS in Shanghai.

Figure 2-1 Hotspot analysis using kernel density

To do the statistical analysis and modeling for the next part, the author needs to have a clear understanding of which CIS are within a cluster and which spaces are not. Density-based spatial clustering of applications with noise (DBSCAN) is one of the most common and cited clustering algorithms in the scientific literature (Ester, Kriegel, Sander, & Wu, 1996). The algorithm mainly
has three steps (Schubert, Sander, Kriegel, Xu, & Ester, 2017): first, the user defines the *radius* for the searching of points, and then the algorithm will identify core points which have at least *minPts* number of neighbors. Second, find the connected components of core points on the neighbor graph, ignoring all non-core points. Finally, designate each non-core points to the cluster if it is within the *radius* of a nearby cluster. Otherwise, it will be identified as noise.

![Image: Illustration of dbscan (source: Wikipedia)](image)

Using this algorithm, the user needs to define two parameters, the *radius* and the minimum number of points (*minPts*) within the radius. Lacking references in literature, the author used the result from kernel density estimation as a reference. *Radius* is defined as 1000m to evaluate proximity by foot traffic, and most studies that evaluate pedestrian behavior in Shanghai use 1000m as the study area (Chen, Jiao, Mao, & Wu, 2017; Pan, Shen, & Zhang, 2009; Xinjun, Hailong, & Yinghui, n.d.). For *minPts*, the author gradually increased the number from 3 to 12 and finally got a result that saw a similar pattern with kernel density estimation (see Figure 2-3).

The algorithm will assign a db value to each of the points. Outlier points will be assigned -1, and others will be assigned value larger than -1 based on their cluster. Each point in the clusters will be assigned a value larger than minus one.
Figure 2-3 DBSCAN analysis of clusters

Figure 2-4 Comparison between kernel density method and DBSCAN - identify the clusters
2.2 Conceptual framework for cluster analysis

2.2.1 Literature review

CIS practice in Shanghai translates some theories mentioned in chapter one into practice. From interviews with space managers, they are extremely sensitive to locations, emphasize community building and hosting events. The market of CIS in China is very competitive over the last three years, which it has already seen a wave of close-downs. When the author was investigating at the beginning of 2018, the CIS market in Shanghai has been relatively stabilized, and spatial patterns have generated within the city. In theory, in a market-based economy, what CIS managers consider essential is user preference. CIS users are mainly creative, talents and high-skilled workers. Existing literature has discussed a lot about how non-market public goods, such as affordable housing, transportation, healthcare, education, leisure facilities, retail, natural amenities makes certain places more attractive for creative and talent workers, and what spatial qualities shall urban planners and stakeholders value in knowledge-based urban developments (Florida, 2002, 2008; Glaeser & Saiz, 2003; Insch & Florek, 2008; Kunzmann, 2012; Yigitcanlar, Baum, & Horton, 2007). Yigitcanlar (Yigitcanlar et al., 2007) expands the discussion about social interactions and argues that because high-skilled workers process abstract information every day, it becomes a psychological necessity for them to have face to face communications, to see and to be seen in public spaces. Therefore, parks with outdoor activities, streets with outdoor seatings, storefronts with transparent glass windows make the streetscape a stage-setting to help facilitate the psychological needs for this particular group (Yigitcanlar et al., 2007).
2.2.2 Historical context

Most of the literature is based on the context in the U.S. and other western countries. Regarding the cultural differences between China and western countries, the author wants to take a review back to the history of the social and cultural context in Chinese cities.

2.2.2.1 Danwei

Danwei was the “basic unit of urban life” during the central planning period in socialist China. As Bray defined (Bray, 2005): “danwei is a generic term denoting the Chinese socialist workplace and the specific range of practices that it embodies, which marks a common system shared by all urban Chinese workplaces.”

The economic goal of China in the 1950s entailed transformation from a small-scale peasant economy to an industrialized nation. The policy at that time was to create state-owned enterprises for industries. Regarding science and technology, the government established Chinese Academy of Science and other industrial research institutes, where research institutes were dedicated to research, and universities were dedicated to education. As a result, the "danwei" model emerged as the physical response to this central planning strategy. Estimation showed that in 1978, 95% of urban residents were assigned to danwei (Lyu, Ding, Fan, & Meng, 2017).
The design of a typical danwei model was a walled or fenced compound with controlled access points (gates). Headquarters will locate along or at the end of the central axis. A danwei complex is designed to have three kinds of spaces: spaces for living, spaces for working and spaces for social services. These three spaces, although functionally distinct, remain physically interconnected or juxtaposed. Amenities included within a danwei unit varied according to the
status of danwei and shared in a hierarchical order. A high-status danwei will have well-developed shopping centers, schools, gyms, movie theatres and so on. A modest danwei will have only basic laundry spaces and some open spaces.

In general, danwei mixes live, work and play within one spatial unit of the city. Through the design of space, it confines one’s administration association, as well as creating a strong tight within the commune, where life and work can hardly separate.

2.2.2.2 High-tech Development Zone

After the 1978 open door policy, Chinese government focused their effort on restoring and reforming science and technology development. In 1988, the torch program was set up to expedite the development of science and technology sector. Following the theory of industrial agglomeration and inspired by the model of Silicon Valley and route 128, the high-tech development zone was thus introduced on the urban edge. High-tech development zone is also the first attempt that Chinese urban planning institutes introduces the zoning system in the US. The design of HIDZ prioritizes the usage of cars with large blocks and wide roads. Single-use
zoning is employed to facilitate the agglomeration of high-tech research and production. Most of HIDZ were located on farmlands isolated from the urban center. Incubators, as an early form of CIS, were mainly located in HIDZ or industrial parks.

Figure 2-7 An example plan of HIDZ in Hefei

Over the years, many high-tech industrial parks have been praised for their contribution to total factor productivity, foreign direct investment, and local income level (Wang, 2013), as well as shaping the edge cities (Zheng et al. 2017). The most successful ones are Beijing ZGC and the Suzhou high-tech zone. However, developments of HIDZ also raised many controversies. Feldman criticizes the phenomenon that governments blindly rely on the cluster theory and
provides a substantial amount of subsidies, yet the city received little economic return and social benefits. It is not only a financial waste but also a waste of land resources. In many of the high-tech development zones in China, the financial subsidies did not bring the promised industrial agglomeration but raised many conflicts between the farmers and the government. Furthermore, it is also discovered there is a diminishing return of industrial agglomeration. A study of Beijing ZGC suggests that recently, the park has been facing problems such as weakening linkage between the university and industry, as well as rising rents that drives startups away (Tan, 2006).

The spatial layout of HIDZ is radically different from any traditional Chinese city layout or the danwei layout. The streetscapes where used to be the spaces for everyday social interactions lost its unique spatial quality to be a claimable space to facilitate socializing. The segregation between living spaces, workspaces, and public spaces becomes the primary defects of HIDZ. Big box shopping malls are designed as a substitution for social spaces. However, unlike danwei or

Figure 2-8 A conceptual diagram of HIDZ

the traditional urban spaces, where the intimate building scale improvises encounters, and social interactions, the built environment of HIDZ prohibits everyday social lives happen due to a decrease in foot traffic and difficult access to social spaces.
On the other hand, there is a growing number of studies discussing how the quality of life and urban spaces affect location choices of high skilled workers (Chatterji, Glaeser, & Kerr, 2014; Florida, 2002). As most HIDZ are designed with wide streets targeting auto transportation, strict zoning regulations that separate live, work and play, as well as long distances from city centers, they are losing attractiveness for young urban professionals and talents.

2.2.2.3 Creative Industrial Clusters

The emergence of Creative industrial clusters (CIC) is a beginning to bring the production spaces back to the city center. CIC have formed largely as a transformation of danwei starting from the late 1990s. Many famous CIC such as 798 in Beijing and M50 in Shanghai were used to be state-owned factory-units in the 1950s. In the 1980s, many state-owned factories either moved to the high-tech development zones on the urban edge or declined with economic reform. Thus, they left a significant number of building stocks vacant or underutilized in central urban areas. After renovation and reprogramming, these underutilized properties become art galleries, artist studios, office spaces or lofts.

Red Town is an economically successful example of CIC in Shanghai. The site of the red town was a factory established in 1956 (Lu, 2016). The project started with a sculptural park as the central public art space. The typical typology in Red Town is commercial spaces on the ground level, such as restaurants, coffee shops, dessert shops or gallery spaces, while offices are on the second floor. Therefore, it combines social spaces with production spaces, which has ambient street-level activities as well as a relatively independent production space.
knowledge-based urban development (KBUD), also known as innovation district, has become one of the primary economic development strategies for many global city governments. Although Chinese government promoted CIS instead of innovation district, many recent master plans have caught up with the buzzword “innovation and entrepreneurship,” including the Xiong’an new city plan. Distinct from previous typologies, KBUD focuses on characters other than production spaces. One is the quality of urban life, and the other one is space for interaction. According to Katz and Wagner (Katz & Wagner, 2014), key factors of innovation districts are to integrate with its urban context; break organizational hierarchies; enhance interactions, communication, and collaboration between industries and other knowledge communities; promote face-to-face interactions and eventually lead to technology advancement.

Knowledge community precincts in a city are not ivory towers in the urban jungle, nor communities gated against visitors and burglars. They are, ideally, catalytic locations for urban life. They are experimental life spaces for the next urban

Figure 2.9 A conceptual diagram of CIC
generation and laboratories for testing new forms of work-leisure– home lifestyles.
(Yigitcanlar, 2010)

From a design perspective, the design of KBUD requires a compact spatial layout to increase
density; integration to existing urban fabric; connectivity to public transportation; a diversity of
programs and functions, as well as a diverse population; walkability and bikability, public
spaces and social spaces for interaction, communication and collaboration (Katz & Wagner,
2014; Kunzmann, 2012; Yigitcanlar, 2010). Thus, the author proposes that, with the CIS
developments in Chinese cities, it will bring back the proximity between workspaces, live spaces
and social spaces. Through the network constructed by CIS and other types of third places,
spaces for social interactions and the sense of community will also resume in everyday life in
Chinese cities (refer to Figure 2-10).

![A conceptual diagram of KBUD](image)

**Figure 2-10 A conceptual diagram of KBUD**

### 2.2.3 Survey Results

After a review of the literature and historical context, the author takes a closer look at the
variables that can define or measure the live-work-play model mentioned above, as well as
spaces for social interactions. At the beginning of 2018, the author went for a site visit to several
CIS. Interviews were conducted with 18 space users and 15 space managers (see appendix1). Space users claim restaurants, and convenience stores are the most visited among CIS users. 72.2% of the users claim to be frequent visitors to convenient stores and restaurants. 50% of the users claim to be frequent visitors to coffee shops. 11 out of 17 users live in rental units, and their primary transportation method is by metro. Here (Figure 2-11) is a summary of the interview results, which will help construct the conceptual framework in the next chapter.

![Figure 2-11 Survey results](image_url)
Chapter 3 Evaluating CIS clusters from six criteria

3.1 Six criteria

Drawn from the conclusions in the last part, the author comes to six criteria that are generated to direct the evaluation: affordable housing, connectivity (to anchor institutions), social space, are the three criteria refer to the live-work-play model. Building typology and walkability are two measurements for the built environment, and the last criterion, innovation environment is a conclusion of the evaluation of the innovation ecosystem of the cluster.

**Affordable housing** has been proposed as one of the essential public goods to attract creative class and talents to the city (Kunzmann, 2012; Yigitcanlar et al., 2007). The affordability can be measured comparing rental units to owner-occupied housing developments. As Shanghai has a high price-to-rent ratio\(^8\), rental units represent a more affordable housing choice.

**Social spaces** such as coffee shops, bars, and restaurants, which are claimable spaces that people can have face-to-face interactions, are critical to the innovation ecosystem (Jackson, 2017).

**Connectivity** to anchor institutions or companies is one of the primary considerations for CIS developers. As Glaeser argued (Glaeser et al., 1992), a diversity of industry will facilitate knowledge spillover and thus, expedite the growth of industries.

**Building typology**: As many scholars have claimed, having a variety of building ages is a critical factor to attract CIS (Feldman & Choi, 2015; Zapalac, 2015). Thus, looking into the

---

\(^8\) Price-to-rent ratio in Shanghai is 45 vs Boston is 28.7 in 2017.
building typologies in the neighborhood will be an excellent way to understand how the urban form could have an impact on the clustering effect of CIS.

**Walkability** has been elaborated in the literature review part that it is a crucial component in the development of innovation district. Walkability is also a representation of the live-work-play model that emphasize urban life quality, rather than the production spaces itself.

**Innovation environment** is a concluding measurement for the previous five characters and also incorporate interviews with CIS users to evaluate how these CIS clusters perform in the urban environment.

The first three criteria will be examined using statistical modeling. The latter three criteria will use case studies to examine partially because of data limitation, and partially because certain aspects in the latter three criteria need to have a closer look into the context beyond merely data analysis.

### 3.2 Statistical model

Affordable housing, social spaces, and connectivity reflect three aspects of live, play and work respectively. The construction of the model will mainly focus on whether the emerging CIS clusters respond to the live-work-play urban development model. Other factors such as gravity index of entertainment facilities and its Shannon diversity index, accessibility to metro stations, distance to city center, gravity index of shopping malls, gravity index of convenient stores will be included in the model as control variables ($Z_t$).

To test if a CIS belongs to a cluster or not, a probit model is introduced, where
\[ y_i^* = \alpha + \beta_1 \text{Live}_i + \beta_2 \text{Work}_i + \beta_3 \text{SocialSpace}_i + \beta_4 Z_i + \varepsilon_i \]  

(1)

For living spaces, accessibility to housing and rental units are the indicators. For workspaces, accessibility to anchor companies (as defined in the POI dataset), accessibility to IT companies, distance to the nearest university, accessibility to research institutes are the indicators. For social spaces, accessibility to coffee shops, bars, parks, Chinese restaurants and exotic restaurants are included. Control variables include accessibility to restaurants, entertainment facilities, metro stations, retail and distance to city center. The gravity index is used to measure accessibility.

Gravity\, r[i] represents a node \( i \) at a radius of \( r \) is defined as follow:

\[
Gravity r[i] = \sum_{j \in G \setminus \{i\}, d[i,j] \leq r} \frac{W[j]}{e^{\beta d[i,j]}}
\]  

(2)

\( \beta \) is the exponent that controls the effect of distance decay on each shortest path between \( i \) and \( j \), \( d[i,j] \) is the distance between \( i \) and \( j \). In this thesis, \( \beta \) is set to be 0.002 (Sevtsuk, 2017). \( W[j] \) is the weight of a specific destination \( j \) that is within the defined radius \( r \) from \( i \), however, this thesis will not include any weight because of the limitation of the data.

---

\( ^9 \) People plaza as the city center.

36
<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
<th>Mean</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Living Spaces</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td>Continuous variable, gravity index between the CIS and all reachable housing developments (centroid) within a 1000m radius</td>
<td>34.531</td>
<td>26.520</td>
</tr>
<tr>
<td>lrental</td>
<td>Continuous variable, a log of gravity index between the CIS and all reachable rental units within the 1000m radius</td>
<td>-1.737</td>
<td>6.312</td>
</tr>
<tr>
<td><strong>Workspaces</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AnchorCompany</td>
<td>Continuous variable, gravity index between the CIS and all reachable anchor companies within a 1000m radius</td>
<td>0.245</td>
<td>0.462</td>
</tr>
<tr>
<td>IT</td>
<td>Continuous variable, gravity index between the CIS and all reachable IT companies within a 1000m radius</td>
<td>10.830</td>
<td>9.794</td>
</tr>
<tr>
<td>University</td>
<td>Continuous variable, the distance between the CIS and its nearest university gate (m)</td>
<td>872.463</td>
<td>896.197</td>
</tr>
<tr>
<td>ResearchInstitutions</td>
<td>Continuous variable, gravity index between the CIS and all reachable research institutions within a 1000m radius</td>
<td>4.302</td>
<td>5.459</td>
</tr>
<tr>
<td><strong>Social Spaces</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td>Continuous variable, gravity index between the CIS and all reachable research coffee shops within a 1000m radius</td>
<td>9.994</td>
<td>10.785</td>
</tr>
<tr>
<td>Bar</td>
<td>Continuous variable, gravity index between the CIS and all reachable research bars within a 1000m radius</td>
<td>4.556</td>
<td>6.594</td>
</tr>
<tr>
<td>Park</td>
<td>Continuous variable, gravity index between the CIS and all reachable research parks(centroid) within a 1000m radius</td>
<td>0.946</td>
<td>1.165</td>
</tr>
<tr>
<td>ChineseRes</td>
<td>Continuous variable, gravity index between the CIS and all reachable research Chinese restaurants within the 1000m radius</td>
<td>64.667</td>
<td>60.683</td>
</tr>
<tr>
<td>ForeignRes</td>
<td>Continuous variable, gravity index between the CIS and all reachable research foreign restaurants within the 1000m radius</td>
<td>23.012</td>
<td>26.604</td>
</tr>
</tbody>
</table>
Table 3-2 Probit model of CIS cluster

<table>
<thead>
<tr>
<th></th>
<th>Live</th>
<th>Work</th>
<th>Play</th>
<th>L-W-P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Living paces</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td>0.006***</td>
<td></td>
<td></td>
<td>0.007***</td>
</tr>
<tr>
<td>lrental</td>
<td>-0.009**</td>
<td></td>
<td></td>
<td>-0.005</td>
</tr>
<tr>
<td><strong>Workspaces</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AnchorCompany</td>
<td>-0.169***</td>
<td></td>
<td>-0.195***</td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td>0.019***</td>
<td></td>
<td>0.015***</td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>-0.0001*</td>
<td></td>
<td>-0.00005</td>
<td></td>
</tr>
<tr>
<td>ResearchInstitutions</td>
<td>-0.002</td>
<td></td>
<td>-0.006</td>
<td></td>
</tr>
<tr>
<td><strong>Social Spaces</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td></td>
<td>0.011</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>Bar</td>
<td></td>
<td>-0.014</td>
<td>-0.017</td>
<td></td>
</tr>
<tr>
<td>Park</td>
<td></td>
<td>0.110***</td>
<td>0.088***</td>
<td></td>
</tr>
<tr>
<td>ChineseRes</td>
<td></td>
<td>0.002*</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>ForeignRes</td>
<td></td>
<td>0.002</td>
<td>0.006**</td>
<td></td>
</tr>
<tr>
<td>Control variables</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>361</td>
<td>361</td>
<td>361</td>
<td>361</td>
</tr>
<tr>
<td>pseudo R2</td>
<td>0.227</td>
<td>0.312</td>
<td>0.291</td>
<td>0.401</td>
</tr>
</tbody>
</table>

*p<0.1; **p<0.05; ***p<0.01

Some results from this model are counter-intuitive and do not align with the findings from the interview and existing literature. For example, the result of rental units, as well as distance to universities, research institutions, coffee shops and Chinese restaurants do not show any significant results. The cluster method used here may be problematic. The dbscan method is based on point-to-point linear distance without considering the road network. However, the independent variables take into consideration of road network and distance decay. Thus, the
calculation of independent variables does not align with the calculation of the dependent variable.

Given this mismatch of calculation method, the author employs a third methodology to define the density of CIS: the gravity method, which aligns with the calculation of the independent variables. The gravity index of a particular CIS $i$ is the sum of the decayed distance between point $i$ and all the other CIS within the 1000m radius (Sevtsuk & Mekonnen, 2012). Therefore, the measure of density is a more accurate measure of the network, which takes into consideration pedestrian travel between different spaces. From interviews, events held in many CIS are open to other community members, therefore, if there are more CIS around within a 15 minutes walking distance, the more attractive the CIS will be and the larger a community it can reach. The author remapped the CIS gravity index and achieved a similar result with the previous two mapping results (Figure 3-1).
Figure 3-1 CIS cluster map in Shanghai using gravity index as the measurement
In Table 3-2 and Table 3-3, each of the two tables has four models: live, work, play and live-work-play. The live model only includes parameters associated with living spaces and control variables. The work model only includes parameters associated with workspaces and control variables. The play model only includes parameters associated with social spaces and control variables. The live-work-play model includes all parameters and control variables. Comparing
the first three models in each table, the work model always has the highest value of $r^2$ square, which means that the industry has the largest impact on CIS clusters compared to the other two. This finding aligns with Darchen and Tremblay’s (Darchen & Tremblay, 2010) argument that the quality of space does not play as important as a role of career choices among knowledge workers/creative class.

3.2.1 Connectivity

For industry part, there are two factors significantly contributing to the clustering of CIS. When accessibility to IT firms increases by one, the gravity index of the CIS increases by 0.162. When the distance to the nearest university decreases by one kilometer, the gravity index of the CIS increases by 0.4. These results indicate that CIS tend to cluster near IT companies and universities.

The effect of universities to innovation industries has been well documented in the literature (Chatterji et al., 2014). The first reason is the innovation spillover from universities. Being close to university means more cooperation with university professors and more opportunities to convert innovation into commercial products. The second reason is the talent from universities. Encourage college graduates to start their own companies is one of the initiatives that follow the mass innovation and entrepreneurship initiative. Therefore, college students are potential users for CIS and many CIS are jointly funded by the university and government. Lastly, being close to universities means more affordability and more opportunities for knowledge exchange for CIS users. During one of the interviews with one CIS user, he claimed that being close to university has many advantages. One is that he can go to school’s cafeteria for lunch, which is much more affordable for an early stage entrepreneur. The other
advantage is that he can get easy access to the lectures and talks hosted by the university.

Therefore, it is economical to work near universities, and being close to universities makes easy access to knowledge. These two advantages are especially important to early entrepreneurs and high-skilled workers.

The impact of IT industry has not documented in the literature. However, the accessibility to IT companies remained strongly significant in many models that the author tried, which also adds to the higher prediction ability of the model. Meanwhile, the rapid expansion of the IT industry in China in recent years has been a phenomenon. In recent years, IT industry has the highest growth rate among other industries and has fostered a large number of startups, such as internet platforms related to the shared economy, e-commerce, and also new media. Therefore, IT startups are the major users of CIS and CIS cluster in an area where it has a high IT industry density to gain access to a larger pool of potential users.

3.2.2 Affordable housing

Regarding places for living, owner-occupied housing has an negative effect on the clustering of CIS, whereas renter-occupied units, has a positive effect on the clustering of CIS. This statistical finding also aligns with the interviews, where 64.7% CIS users are renters. Results from table 2 suggest that when gravity index between CIS and rental units increases by one, the gravity index of CIS will increase by 0.041. However, when gravity index between CIS and housing developments increases by one, the gravity index of CIS will decrease by 0.015. These empirical results suggest that CIS tend to cluster in places where there are more available rental units instead of owner-occupied housing developments.
One reason is that many of the CIS users are new graduates from college, and they cannot afford to purchase housing units in Shanghai. Another reason is that for many entrepreneurs, time is precious for them. Since the market competition is intense, many entrepreneurs have no regular working hours, let alone weekends. Therefore, entrepreneurs cannot afford long commuting hours and being able to live nearby is of critical importance. The results show some instability between table 1 and table 2. The limitation here is the lack of subway network in the calculation. Since the previous survey indicates that 70.6% of CIS users commute mainly by metro, when calculating the gravity index between CIS and housing units, the author shall also add the subway network into the calculation. However, due to the limitation of the subway network data and time, this thesis only considers the reachable housing developments within the 1000m radius.

3.2.3 Social Spaces

For social spaces, accessibility to coffee shops, bars, and Chinese restaurants play a positive role in the clustering of CIS, while parks play a negative role. While findings for coffee shops and restaurants align with existing literature (Green, 2014; Jackson, 2017; van Oort, Weterings, & Verlinde, 2003), the effect of the park is contrary to one paper from Yigitcanlar (Yigitcanlar et al., 2007). There are three explanations to interpret this different finding.

First, Yigitcanlar focused on Australian cities, where it has a different cultural context. Second, many parks in Shanghai occupy a large area separated by major infrastructures, such as highways (Figure 3-2). Therefore, the actual accessibility to parks is low. Finally, office buildings around park spaces are usually expensive. For startups or CIS users, it is less likely that
they are willing to pay the premium for parks or open spaces. Therefore, CIS tend not to cluster around parks.

One adding here is about the restaurants. In China, restaurants are the primary places for meetings and businesses. Therefore, restaurants are also an important social space for Chinese entrepreneurs. One conclusion here is worth noticing, regarding social spaces, restaurants, bars and coffee shops, compared to parks, are privately owned public spaces which are semi-private or semi-public, which adds a layer of public spaces and social life. An example of Jiang’an Temple Cluster is demonstrated here: for every CIS, there are more than 100 social spaces reachable within the 1000m radius (Figure 3-3).

Figure 3-2 Parks and major infrastructure
Figure 3-3 Reachable social spaces from CIS in JTC
3.3 Case studies

As discussed previously, the latter three criteria (building typology, walkability, and innovation environment) will be evaluated using case studies. Among the four clusters, the Caohejing cluster and Zhangjiang cluster are located in high-tech development zones, which are out of the discussion in this thesis. Thus, the case study will use knowledge innovation community (KIC) and Jing’ an cluster (JTC) as the case study sites.

KIC is a public-private-partnership development project jointly developed by a Hongkong real estate developer, Shui-on group, and Yangpu district government. With physical proximity to two famous universities in Shanghai, the project brand itself as the community of innovation and entrepreneurship. KIC has an even number of public funded CIS and private funded CIS, with the lowest rent prices and vacancy rate.

JTC located in the old city center of Shanghai has the highest concentration of CIS in Shanghai but also has the highest average rent prices. The formation of the cluster is a bottom-up process, which is an opposite approach with KIC. According to government reports10, the potential of JTC will keep rising in following years. The author thinks it will be interesting to compare KIC case with JTC case since both of them are successful in different dimensions with entirely different approaches.

http://www.stcsm.gov.cn/xwpt/kjdt/348630.htm

10
3.3.1 Building typology

3.3.1.1 JTC

Jing'an Temple community resides in the old city center of Shanghai, which is also a part of the old French concession area. Because of its richness in culture, it is also known as the place for creative class in recent years. Rather than the ubiquitous new towns constructed in a few years, evolvement in the city center is an incremental process, resulting in a mixture of low rise fine-grained neighborhoods and high-rise tower structures, maintaining its livability, its richness in culture and at the same time flourish regarding economic development (Zhou, 2017).

The neighborhood has quite a vast range of different building typologies, ranging from the most expensive class A office buildings along Nanjing West Road to the old and dilapidated, two-story height residential buildings back in the early 1920s. The diversity of building typologies leads to attractions of different types of production entities. Big brand transnational companies locate in the pricy Class A office buildings, whereas art studios, small and medium enterprises rent in lower prices in the old neighborhoods, which is affordable but with excellent location and resources.

The diversity of building typologies JTC also attracts a diversity of CIS developers, including major players in both global and local market, such as wework, xnode, Soho 3Q, fttown, and so on. Not only the CIS developers are from different backgrounds, but also their occupants. In Xnode, 50% of its occupants come from abroad, and their startup teams come from 18 different countries. CIS such as Xnode and Wework provide a platform for startups from abroad to make their path in markets in China. Most foreigners are more comfortable in hanging around JTC, because of its spatial qualities and its unique cultural characters.
The design of KIC emphasized on creating diversity regarding building typologies to attract different types of tenants, thus accommodate a mixture of big and small firms. A 20-meter wide expressway Songhu Road divides the site of KIC, which divide this project into two distinct neighborhood scales. On the east side of Songhu Road, where it has the historical stadium nearby, the neighborhood scale is relatively big. Because of the historic stadium on the east, the height limit of this block adjacent to the stadium is 50m. The building typology on the east side has large anchor companies in IT industries, such as Google, IBM and so on.

KIC on the west side provides a more intimate building scale. Each block is about 100m by 55m, with building depth being approximately 6m or so. The buildings are designed with loft units, which are ideal spaces for startup companies. The spatial character of loft gives the flexibility to mix work and live. Its flexible spatial layout allows entrepreneurs to adapt the space to their
offices, labs, or galleries. If combined with ground floor parking space or retail space, it creates more design opportunities with a two-story space and thus stimulates the social life on the street level.

However, these two sites are spatially segregated by the wide road in between. Unlike JTC, CIS developers and users in KIC are mostly related to IT-related industries, and many of them are funded by IT-related companies, such as Tencent, itjuzi, and innoway.

3.3.2 Walkability

Walkability relates to three characteristics: ground level commercial activities, edge permeability, parcel width, and setback space (Sevtsuk, Kalvo, & Ekmekci, 2016). Limited to data availability, the author is only able to map out the ground level commercial activities, edge permeability and some of the setback conditions for each of the clusters.

3.3.2.1 JTC

Figure 3-5 shows the betweenness of the streets between CIS and metro stations\(^1\), ground level commercial activities, edge permeability and the setback conditions. It can be observed from the map that CIS and ground level commercial activities are more likely to located at the “back street” or branch roads, where it is not the most used roads with major public transportation access.

---

\(^1\) The betweenness level represents how often the street will be used between the origin and destination. In this case, the origin is the CIS, and the destination is the metro station.
In JTC, when walking between those CIS, you can find yourself crowded in these kinds of narrow streets with people and traffic. The cafes and restaurants were initially the first floor of residential units, transformed to commercial activities. From the street section, you can see the street is not designed to accommodate such social spaces, but because of the demand, these spaces are emerging in the neighborhood and encroaching the public spaces to the most extent. In some cases, there is only 0.6m for the width of pedestrian (Figure 3-6). Although crowded, this is a lively social space for interactions.
3.3.2.2 KIC

For the case in KIC, walkability is one of the key points emphasized in the design process. University Road, which is a road connecting the universities on the west side to the metro station on the east side, has been one of the example street design written in Shanghai’s new street design guidelines. As explained in the previous section, the loft design makes a lively public
space possible along the University road. The design opportunities with two-story spaces stimulate the social life on the street level.

In Figure 3-7, unlike JTC, CIS and ground level commercial activities tend to locate at the busiest road here. One explanation can be, in JTC, land prices adjacent to metro stations are particular high that CIS cannot afford. Therefore, in a less central location, CIS and other third spaces can afford premier locations. It is also possible that the property management team purposely locate these spaces along the University Road to match up with its original design intention.
The total width from the road to the building façade is 8m, regarding property right, 4m is of public right, used as sidewalks, the other 4m belong to the property, but regulation requires the setback from property line. There is some flexibility in this 8m design. In the graph (Figure 3-8), 2m is designed as facility belt, 3m is designed to pedestrian, and 3m is designated to outdoor seating. Each width is subject to change based on different scenarios. From the design of the street, one can read the consideration of social spaces integrating to the design of the public realm, which is more human-centered. The lively street life of KIC has been attracting many young people and also foreigners to rent housing in this community.

Figure 3-8 A street section of university road

3.3.3 Innovation environment
Table 3-4 Rent comparisons

<table>
<thead>
<tr>
<th></th>
<th>JTC</th>
<th>KIC</th>
<th>Average Shanghai CIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent for ordinary office</td>
<td>5.7/sqm/mo</td>
<td>4.6/sqm/mo</td>
<td>4.1/sqm/mo</td>
</tr>
<tr>
<td>Rent for CIS</td>
<td>2,987/desk/mo</td>
<td>1,268/desk/mo</td>
<td>1,639/desk/mo</td>
</tr>
<tr>
<td>Occupancy Rate</td>
<td>76%</td>
<td>88%</td>
<td>74%</td>
</tr>
</tbody>
</table>

3.3.3.1 JTC

From author’s investigation, most of CIS in JTC is not innovation-driven. The high average rent (Table 3-4) prohibits many startups from locating in. One of the exceptions is People Squared, where it offers a relatively affordable rental price for early-stage startups. However, People Squared also face problems of keeping the tenants. In some cases, when startups got funded from venture capital, they will move to the space provided by the venture capital. For example, a life-science related startup received funding and move to Zhangjiang HIDZ outside the central city, where they are offered free spaces. Therefore, JTC does not have a good industrial background for high-tech companies. However, for cultural and design related firms, JTC is a good place to be.

The growing market of coworking spaces can also be a threat to local communities. Many coworking spaces and entrepreneurs are particularly fond of aged buildings (Zapalac, 2015). The historical buildings in JTC give many opportunities for adaptive reuse. For example, Wework recently opened a new location on Weihai Road, where used to be a dilapidated factory, rented by local artists. The community used to be famous and vibrant. The acquisition of Wework displaced these artists. With an average price of 3200 RMB/mo per desk, Wework is the highest coworking space across the city, which is not affordable for the artists who initially had their
studio here. The emerging tech companies from all over the world are the current tenant here. It is good that developers and government have been aware of historic neighborhoods. However, space alone cannot pass on values; it is the people who are in the space give meanings to the building as well as the neighborhood. So, it is not enough to preserve the buildings, preserving the neighborhood and the culture is also critical.

The history of Xinchejian is one of the examples that how a community has been pushed continuously out in central locations in Shanghai, where redevelopments are in trend. The first hackerspace Xinchejian was founded in 2010 on Anhua road, an old commercial factory building within the French Concession area. They were pushed out from its original location because of an urban redevelopment project. After that, they temporarily placed themselves in various locations until People Square reached out to them and moved to their current location in JTC. People Square gives Xinchejian a reasonable rental rate to locate and Xinchejian, with its fame, acts as the anchor institution in this People Square space in return.

3.3.3.2 KIC

In this part, the author wants to take a brief review of the history here to understand the cultural and economic context in KIC. The place where KIC locates is called Wujiaochang, which is on the northeast edge of Shanghai’s old city area. In the early 1900s, Wujiaochang area was an industrial center with migrant workers and their slum housing. The higher social class live in the south-west of the central city area, which was mostly concessions designated for different countries. To balance western power controlling the central city area, in 1927, the Nanjing National government initiated the Greater Shanghai Plan with the vision to make a new central Shanghai area, branding it as China’s second capital – the financial capital (Wei, 2011). In this
plan. Wujiaochang is the center, surrounded by government buildings and administrative departments.

From the plan layout and architecture style, one can see the ambition of the Nanjing National government to build a new center in Shanghai that will confine foreign concession's influence and reclaim their political and economic power in the city of Shanghai. However, the construction of the plan only went on for seven years till the Japanese invasion during the Second World War. Only a handful of government buildings and public buildings were constructed, including Shanghai’s Stadium, which locates in the KIC plan on the east edge. After the world war II, the Nanjing National government had no financial power to continue the construction, and the plan was soon buried in history. The district went back to be the manufacturing center of Shanghai until the 90s. Thirty percent of industrial production is from the Yangpu district. The latter half of the 90s saw a decline in Yangpu district as an industrial zone, with many factories decayed and deserted.

Therefore, most of the city’s resource was still pouring into the Jing’an district, where used to be the French Concession. The northeastern area, however, in a long time, was still considered as the “Xiazhijiao” (a Shanghainese way to call a place that is less developed). Although Yangpu district does not have the well-established retail streets and office buildings, it has many top universities and research institutions. SOM design team recognized this asset and referred to the Silicon Valley and Paris Rive Gauche. In the design statement, it writes: “through design, programming, and ongoing activities, KIC brings together students, researchers, entrepreneurs, and residents in a “three-zone linkage” of office, retail, and mixed-use community. (Yang, Li, &
Huang, 2017) The new “Greater Shanghai Plan” made its claim for constructing a knowledge and innovation center as a statement and branding at current age.

The appealing urban life and the low cost attract talented people despite its relatively poor industry foundation. The impact of universities and tech giants fostered this environment for entrepreneurship and innovation. Together with the low rents (Table 3-4), KIC becomes an ideal place for young entrepreneurs and startups. From one of the interviews, one CIS users talk about how he can live and work in KIC with a similar quality of life with the central city while paying a much lower living cost. Another CIS user also talks about that although Zhangjiang HIDZ has a stronger industrial background in IT industry than KIC, the living quality in KIC is much better than Zhangjiang, and he prefers to live and work in KIC.

However, despite the merits, two points can be improved in KIC. First, anchor companies and startups are spatially segregated because of the expressway. The author has not found any evidence if that prestige IT companies on the east side has any cooperation or connection with startups on the west side. Secondly, some of the startups proliferate, and they have to look for bigger office spaces to accommodate. However, KIC west side cannot accommodate this requirement because of its limited affordable office spaces. It will be better if there are other floors available in the same building that they can keep the growing startups, which generate knowledge spill-over for other early-stage startups within the community. Thus, to generate a healthy circle of the innovation ecosystem.
3.3.4 Urban development models

In the previous section, the author has taken a review back to different urban development models at different times to understand the Chinese context for constructing the six criteria. Here the author wants to revisit the urban development models, but focusing on its planning process.

According to Bjorklund, spaces within danwei are usually multifunctional, workspaces can be social spaces, and household events may occupy common spaces (Bjorklund, 1986). Since the three types of spaces are spatially intertwined, there is no absolute boundary between social activities, family activities and work activities. People who are colleagues are at the same time neighbors, friends, and comrades. The intimate building scale allows social lives happen in between spaces, such as the roads, alleys, or the hallways. In this sense, these transitional spaces naturally become the space for social interactions. The gated complex builds a strong sense of community within one danwei, yet also retains this community within this danwei. Because of such spatial arrangement of danwei, social spaces are confined in a danwei compound, which means people can only have their social life and activities within their associated danwei, restraining the free-flowing of social interactions between danwei complexes on the urban scale. Therefore, it is rare and difficult to make friends or establish social relationships outside of their associated danwei (Bjorklund, 1986).
Danwei goes far beyond its spatial meaning, but also encompasses the social status, household administration, since a danwei not only pays salary to its workers, but also provides housing, free medical care, child care, dining halls, service companies, and so on (Hanlin Li, 1994). The name and the status of the danwei somehow becomes a social status. At that time, people marked their identity by quoting the name of their danwei, as danwei is not merely the workplace, but also the social organization, the community and the physical space that one belongs to and dwell.

Although the planning of HIDZ often designate specific ratio of public spaces, such as parks, community centers, recreation centers, the accessibility of these spaces remains a question. For example, for 1000 people, there has to be one park or one community center. This designation of programming by a simple number in the context of large parcels and wide roads creates a problem for accessibility. Usually, a park or a community center occupies one large parcel, serving a radius of more than 2km. People who live in the housing developments in HIDZ need to drive to the park or the community center to enjoy a social life. Therefore, the low accessibility of social spaces for those who do not own a car, or who have limited time (usually high-skilled workers who often needs to work overtime) is problematic.

One of the successful examples of CIC is 798. 798 was initially a joint factory with the best amenities at its time. Designed by German architects, the architectural style is strongly influenced by Bauhaus. In the early 1990s, employees in 798 declined from 20,000 to 4,000 (Yin, Liu, Dunford, & Liu, 2015). Thus, the state-owned-enterprise of 798 reformed to a property management company called “Seven Star Group.” 798 has relative proximity to the city center, accessibility to public transportation and amenities, as well as cheap rents. Therefore, artists from the Central Academy of Fine Arts (CAFA), China’s most prominent art school,
relocated to 798 from their original cluster (Lu, 2016). In 2002, Seven Star Group made an urban renewal plan for 798. The plan was to demolish all the factory buildings. However, the announcement of the plan received a strong reaction from the artists who were in 798, as well as other prominent artists and architects across the country. The grassroots protest also received attention from a lot of western media, as well as renowned political figures in the western world. In 2005, Beijing government designated 798 as “Creative Industrial Cluster” and the architectural legacy preserved. The number of art studios reached its peak in 2007. However, with the designation, the rent prices surge in 798. Many less known and young artists were pushed out by the high prices. What replaces these art studios are food and beverage business, and prestige galleries. Only already renowned artists can afford a space there (Lu, 2016). When the ratio between consumption spaces and workspaces reach to a certain point, 798 becomes a tourist site instead a production space and the noises generated from commercial activities become a disturbance for many artists, which contributes to the second largest reason for the leaving of artists. Although 798 is a commercially successful project, it destroys the original artist community.

The complex of 798 received little visibility from the urban space due to its surrounding walls and major roads. Although there is a proposed metro line connecting 798 to the urban fabric, it is hard to tell if the metro stop is set because of 798 or because of nearby 751, which is less known but leased to many anchor companies such as Audio and Nike.

Unlike 798, Red Town remains a space for production with advanced manufacturing companies, as well as a wide range of amenities. Its redevelopment into CIC is a top-down public-private-
partnership approach in the early 2000s. Red Town Cultural Development Company was founded in 2006.

Red Town was acquired by a real estate company when the 10-year lease expired, all their tenants moved out, and building structures all got demolished in 2017. The new proposal for the red town is a commercial complex with high density and some replica buildings in the foreground. This new proposal looks no difference with any normal commercial complex development. However, one can imagine that the rents will surge after the project’s completion, and the original tenants will not afford to move in again.

With the success of the original red town CIC, the founder of Red Town seeks to replicate this design strategy in other second-tier and third-tier cities. However, their developments in other cities have not received the same success as the Red Town project. Many of these projects eventually became tourist destinations rather than its intended goal of a production place for cultural and creative industries¹².

The problems for CIC development can be explained from several aspects. First, many developers oversimplify the development model to an equation. If there are old factories, heritage buildings, artists and cheap rents, then it will promise tourists, rising rents, and an outdoor shopping mall on the right side. However, often, interference from developers push out the original tenants in CICs and thus, lose the source of creativity and innovation. Second, some

¹² https://www.qdaily.com/articles/45055.html
CICs have inadequate access to public transportation or urban amenities. It remains a gated complex isolated from its urban context. For those CICs with central locations and well connected to public transportation, the designation of CIC immediately inflates rents and raises the bar for original companies to stay and new emerging companies to come. This effect is particularly harmful to startups.

Development of CIS clusters or knowledge-based urban development shall have a comprehensive approach rather than the simple list checking of the previous two urban development models. From the case study, we can see various conditions can facilitate CIS clusters, being a historic city center, or a new development with thriving street life and proximity to universities. Projects can succeed in many different ways with the sophisticated approach, rather than a simple checklist.
The main component of CIS is its social space, which has a similar definition and function as “third places.” Different social spaces in CIS convey different social functions. (1) The lounge area in spaces such as Mixspace, We+ works as a T-platform rather than a third place. When the author visited Mixspace during a weekday lunchtime, there is only one group of people using the space.
public area. Other groups of people are having lunch at a more intimate common area. The public space is almost empty except a few bloggers. (2) Social space in CIS such as people squared is a third place as well as a plaza for entrepreneurs. They hold pitch events, demo day, or lunch lecture with entrepreneurs, venture capitals. When the author visited the space on a weekday late afternoon, the lounge area was packed with small groups of people. (3) Social space in CIS such as Soho 3Q is a third space which has the most controlled access except its members who pay for the rent. During author’s visit, the social space is not entirely visible, and very few people were using the space. (4) For makerspaces, the space as a whole is for the community. Xinchejian is a non-profit community organization governed by its members. On their website, they claim to follow the core principle of Do-oacry, which means a form of governance where people make decisions and then do it themselves. Rather than just giving out

---

13 https://xinchejian.com/about-2/
ideas, this form of self-governance requires you to be hands-on and active.

![Nested social spaces](image)

**Figure 3-14 Nested social spaces**

In the neighborhood scale, there is a variety of social space in the private domain, such as restaurants and coffee shops that add to the CIS lounges to generate this nested social spaces with different privacy levels and accessibility. Through these nested social spaces, communities are formed.
Chapter 4 Conclusion

This thesis sheds light on the location choices of CIS in Shanghai and discusses the potential implications of CIS developments for social spaces and urban life. The result of the statistical model provides some insights to understand the location choices of CIS developers, and the logic behind its clustering. The statistical model is based on the hypothesis that CIS developers locate spaces according to the amenities associated with the location, which will be the attraction points for CIS users, who are mostly startups and young entrepreneurs. The model results align with most of the theories in the literature that industrial heritage, places for social interactions and anchor institutions have positive impacts on the clustering of CIS (Audretsch & Feldman, 1996; Florida, 2002; Glaeser, Kolko, & Saiz, 2001). However, the results also suggest some discrepancies with the theory. The negative impact of parks and open spaces to the clustering of CIS is contradictory to Yigitcanlar’s argument about the importance of outdoor activities to young entrepreneurs (Yigitcanlar et al., 2007). The model results also suggest some new findings in the specific context of Shanghai. The results show a strong correlation between IT companies and the clustering of CIS. Moreover, accessibility to rental units also has a positive effect on CIS clustering.

Other than the statistical model, this thesis also uses interviews, surveys, observations, and mappings to have a more in-depth look at the social implications of the CIS clusters. The CIS, along with third places, such as coffee shops and restaurants, is a reminder of the sense of community and a recall for public life. It integrates with the urban context, breaks the boundaries, creates networks and facilitates diversity and conversation between different social groups.
The design suggestions do not mean a checklist. Having a walkable street does not necessarily mean an innovative environment. The built environment and industrial environment as a whole create the ground for the growth of innovation and entrepreneurship. In the end, the author also would like to address some limitations in this thesis. Regarding data, the author grabbed data from multiple online resources, so there are possibilities that some POI data only includes part of the city data, and some POI data includes another part of the city data. The data accuracy is also questionable since the latitude and longitude in China always have a certain degree of mismatch. The author used code from online resources to convert the lat and lon to match with the road network dataset. The model also has some limitations. When calculation, the author only considered road network but left out subway network, which is the major means for commuting in Shanghai. In future work, the author should include the subway network into consideration.
References


Darchen, S., & Tremblay, D. G. (2010). What attracts and retains knowledge workers/students: The quality of place or career opportunities? The cases of Montreal and Ottawa. *Cities,


Jackson, L. (2017). The importance of social interaction in the co-working spaces of Boston USA and.


Appendix 1

Survey: The Spatial Pattern of Crowd Innovation Spaces in Shanghai for space managers

调查问卷：上海众创空间的空间属性与城市布局

The following questionnaire is part of my Master of City Planning thesis research on the spatial pattern and characteristics of Crowd Innovation Spaces in Shanghai that aims to support innovation and entrepreneurship. This study will only be used for academic purposes. It is expected to take less than 10 minutes. Any question may be skipped, and your response will be kept anonymous if preferred. Thank you for your time!

Contact: Haijing Liu, haijing@mit.edu

您好，我是一名在麻省理工学院就读城市规划专业的研究生，目前在导师的指导下进行上海众创空间发展的研究项目。

以下调查问卷属于麻省理工学院中国未来实验室及地产创新实验室的研究项目，以及我的城市规划硕士毕业论文研究的一部分。问卷基本都是简单的数字填写和选择题，大约只需要花费 7 分钟的时间填写。您可跳过不想回答的问题，也可匿名回答。

本调查的研究成果将用于且仅用于学术目的。

非常感谢您的支持以及宝贵的时间！如有疑问或咨询，请随时联系。

刘海静 联系方式：haijing@mit.edu 微信：haimian434523

1. 空间名称 Name of space
2. 空间地址或所属商圈 Street address or submarket?
3. 该空间成立时间 (年/月) When did this space open?
4. 空间面积多少平米 How large is the space (square meter)?
a. What is the share of public space (in square meter or percentage)?

b. What is the share of open office space (in square meter or percentage)?

c. What is the share of private offices (in square meter or percentage)?

5. Which of the following does your space include? (click all that apply)
   a. Hot desk or dedicated desk
   b. Maker space or fab labs: shared tools and equipment
   c. Private office
   d. Retail space
   e. Meeting rooms
   f. Event space
   g. Gym
   h. Sleeping tanks
   i. Shared wetlab
   j. Private wetlab
   k. Other, please indicate

6. What types of programming and services do you offer? (click all that apply)
   a. Business coaching and mentorship
   b. Legal service
   c. Meeting with Investors or Demo Day (Pitch Day)
   d. Networking Events
   e. Access to Corporate Partners
   f. Professional development courses or trainings
   g. Other, please indicate

7. Does the space target in a specific industry?
   a. Yes
   b. No
   c. Not officially, but many of our members work in:

75
8. Approximately how many members or users do you currently have?

9. How many members or users could the space support?

10. Which best describe your members or users? (select up to 3)
   a. Self-employed individuals
   b. Start-up founders working alone
   c. Start-up teams
      i. Not founded yet
      ii. Series A-B
      iii. More mature
   d. Established small businesses choosing to work in a collaborative or shared environment
   e. Employees of established companies working remotely
   f. Branch offices
   g. Students
   h. Other, please indicate

11. What is the shortest rental period?

12. Which are the most common reasons for members leave? (select up to 3)
   a. Prefer another coworking or innovation space
   b. Prefer conventional office lease
   c. Can't afford membership fees
   d. Need larger space
   e. Moving business to another city
   f. Business was acquired
   g. Changes in production technology or processes
   h. Unsure

13. Which of the following sources did you use to acquire and renovate the space? (check all that apply)
   a. Private equity
   b. Bank loan
   c. Government grant or subsidies (please list specific name)
   d. University grant or subsidies
e. Corporate sponsorships
f. Foundation grants
g. Other, please indicate

14. What was the approximate hard and soft cost per square meter to build and renovate the space?
15. What is the current land use zoning?
   a. Residential
   b. Public Amenities
   c. Commercial
   d. Manufacturing
   e. Logistics
   f. Infrastructure
   g. Public Facilities
   h. Green Space and Park
   i. Rural land for commercial uses
   j. Other, please indicate

16. If the space is in an office building, what is the class of the building?
   a. Class A
   b. Class B
   c. Other

17. Do you own or lease your space?
   a. Own
   b. Lease

18. What is the average current rent?
19. May I mention your company by name in my thesis?
20. What do users generally look for in your space? (select all that apply)
   a. Community
   b. Location
   c. The iconic office building
   d. Interior quality
   e. Services for startups
   f. Industrial connection
   g. Other, please indicate
Appendix 2

Survey: The Spatial Pattern of Crowd Innovation Spaces in Shanghai for space users

The following questionnaire is part of my Master of City Planning thesis research on the spatial pattern and characteristics of Crowd Innovation Spaces in Shanghai that aims to support innovation and entrepreneurship. This study will only be used for academic purposes. It is expected to take less than 10 minutes. Any question may be skipped, and your response will be kept anonymous if preferred. Thank you for your time!

Contact: Haijing Liu, haijing@mit.edu

您好，我是一名在麻省理工学院就读城市规划专业的研究生，目前在导师的指导下进行上海众创空间发展的研究项目。

以下调查问卷属于麻省理工学院中国未来实验室及地产创新实验室的研究项目，以及我的城市规划硕士毕业论文研究的一部分。问卷基本都是简单的数字填写和选择题，大约只需要花费7分钟的时间填写。您可跳过不想回答的问题，也可匿名回答。

本调查的研究成果将用于且仅用于学术目的。

非常感谢您的支持以及宝贵的时间！如有疑问或咨询，请随时联系。

刘海静 联系方式：haijing@mit.edu 微信：haimian434523

1. 空间名称/Name of space
2. 空间地址或所属商圈 / Street address or submarket?
3. 下列办公地点的周边配套中，对您最重要的三项是？ / Among the surrounding amenities, what are the three most important ones for you?
   a. Restaurants
   b. Coffee shops
c. Bars  
d. Convenient stores  
e. Shopping malls  
f. Gyms  
g. Parks  
h. Childcare facilities  
i. Library or book shops

4. For the three amenities selected above, please specify how often you will use the space, the walking distance from your workplace and the average time spent in there.

5. Please specify your identity here.
   a. Entrepreneurs  
   b. Freelancers  
   c. Employees

6. Do you rent or own the house you live in currently?
   a. Owner  
   b. Renter  
   c. Other

7. How long do you spend on commuting every day?

8. Please specify the transportation you most used for commuting.
   a. Private cars  
   b. Bicycles  
   c. Metro stations  
   d. Buses  
   e. Walk  
   f. Car pool