



Jiaanbieyuan New Courtyard-Garden Housing in Suzhou: Residents' Experiences of the Redevelopment

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ABSTRACT

Cultural vitality as the fourth pillar of sustainable development has been widely acknowledged, and vernacular architecture as a major part of a nation's material culture has entered the cultural sustainability dialogue. This recognition demands that new housing design and development should honor a local or regional identity. This in-depth case study assesses the architectural, environmental, spatial, constructional, social, cultural, and behavioral aspects of the Jiaanbieyuan ("Excellent Peace Courtyard-Garden Housing Estate") built in Suzhou, China, in 1998. The 500-unit Jiaanbieyuan is located close to two UNESCO World Cultural Heritage sites, the Canglang ("Surging Waves") Pavilion and the Master-of-Nets Garden. It has attempted to recreate Suzhou's traditional architecture and landscape architecture. Quantitative and qualitative data were collected through numerous research methods, including onsite surveys and interviews. The findings show the new housing forms do not promote social relations as effectively as the traditional housing of the past. Moreover, the communal Central Garden has functioned to some extent as a social and cultural activity space. The study further proposes a new courtyard-garden housing system that facilitates social interaction and cultural activities.

Keywords: courtyard housing, cultural sustainability, architectural regeneration, urban redevelopment, environment-behavior study, China

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1. INTRODUCTION

Cultural vitality has been regarded as the fourth pillar of the overall sustainable development framework alongside the other three: environmental responsibility, economic viability, and social equity [1].

The cultural dimension of sustainability is a crucial part of the theoretical framework of the study because architecture has been considered as a cultural artefact, and so the paper evaluates both archi-cultural [2] and socio-cultural aspects of a new courtyard-garden housing project built in Suzhou, China, to see whether it is culturally sustainable.

In this study, cultural sustainability is defined as the adaptation and transmission of the beneficial parts in a nation's material (tangible) and immaterial/spiritual (intangible) culture that are conducive to the development of their present and future generations [1].

Housing is a very important aspect of architectural culture, not only because it concerns people's everyday living, but also because vernacular houses are a major part of a nation's material cultural heritage that must be preserved. It contains the cultural codes and symbols that are vital national heritage to pass on to younger generations. New housing development should therefore honor a local and regional identity by following traditional design principles and features.

However, compared with the amount of literature on new housing studies in iconic Chinese cities such as Beijing and Shanghai, there are much fewer studies on Suzhou housing development in recent decades [1, 3-5], this paper hopes to reduce this disparity.

1.1. Suzhou city planning

Suzhou is located south of the Yangzi (Changjiang) River in the southeast of China, about 83 km to the northwest of Shanghai, only 30 minutes by high-speed train. Suzhou has a rich history and culture of 2500 years. During the Spring and

Autumn period in 514 BCE, the city was built as the Wu State (吴国) capital by Wu Zixu (伍子胥, c.559–484 BCE), who “examined the soil and tasted the water, and mimicked the heaven and followed the earth” [6] (my translation). Suzhou's old city location has not shifted since its inception because of the wise choice of the site [7]. Situated on the shores of Lake Tai in the lower reaches of Yangzi River, Suzhou has a latitude of 31°19' N and longitude of 120° 37'E, it enjoys a mild and humid subtropical climate with plum rains [8] in June and July [9-11].

Suzhou's prosperity began after the construction of the Jinghang Grand Canal in the Sui dynasty (581–618), and the city was named Pingjiang (“Peace River”) in the Song dynasty (960–1279). The Pingjiang map [dated 1229; Figure 1] is the oldest and most complete ancient city plan in China, offering an important source for study the transformation of Chinese cities from ward to neighborhood system.

The Pingjiang map shows that Suzhou's old city is rectangular in plan, about 6 km north-south and 4.5 km east-west, with a formal and regular but free and flexible layout. Suzhou planners applied the principles in the *Rituals of Zhou*, the Nine Squares System, and *Feng Shui* (“Wind and Water”), making the city well integrated with the surrounding natural environment [1, 10, 12].

Pingjiang was laid out south by east 7°54' to take advantage of the southeast wind for cooling in the summer and avoiding direct winds in the winter. The eight city gates are in line with the eight trigrams (*bagua*), pointing to the eight principal directions as well as following the waterways [1, 10, 11].

平江圖

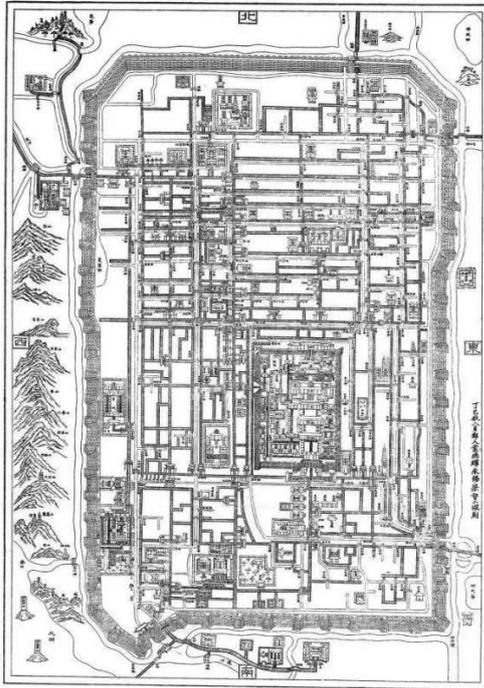


Figure 1. The Pingjiang map (dated 1229) from a stone stele showing a double-chessboard, road-river system. Source: Courtesy of Suzhou Inscription Museum (Suzhou Confucius Temple)

Suzhou was planned with “water” in mind since ancient Chinese people looked on water as blood of the earth, and believed that the prosperity of a city depended on the circulation of water. The 14.2 sqkm old city has 35 km of artificial rivers, often 3–5 m deep and 10 m wide, directed from Lake Tai, because Suzhou is near the Yellow Sea in the east and the Yangzi River in the north; digging canals and building city walls were thought to be best strategies for flood prevention.

Suzhou has a double-chessboard grid pattern, with waterways (*Yin*) and roads (*Yang*) complementing each other connected by 168 bridges. Principal canals run east-west and most streets are parallel to them.

The urban blocks normally have a rectangular shape with 2-3-storey traditional houses along east-west lanes facing south-north. This arrangement forms a unique Suzhou style of “little

bridges, rivers, and houses.” This basic plan has been maintained in Suzhou’s old city until today^[10, 11].

Suzhou was praised as “Paradise on Earth” and “City of Gardens” because of its favorable natural conditions for growing lush green woods, fish, and rice. With 1500 years of gardening history, Suzhou had more than 170 gardens by the end of Qing (1644–1911), more than 60 of them are completely preserved, and 19 open to the public today^[13]. Suzhou is such a place that “one can enjoy landscapes without going outside the city, and live in busy streets with the sights of forests and tastes of spring water”^[14] (my translation). Hence, in imperial China, retired officials, literati, and wealthy merchants settled in Suzhou, resulting in its prolific number of renowned celebrities and outstanding talents. Suzhou Pingtan is one of the top four national operas; story-telling, ballads singing, and Kun Opera are referred to as the “Three Flowers of Suzhou Culture”^[9-11, 13, 15-17].

The old city of Suzhou was divided into 60 wards in the Tang (618–907) and 65 wards in the Song (960–1279) dynasties. With rapid economic development in mid-Northern Song (960–1127), a new neighborhood system emerged, and gradually replaced the old ward system. The scroll painting *Gusu Fanhua Tu* (“Suzhou Flourishing”) by Xu Yang in 1759 [Figure 2] portrays the city’s prosperity in the late 18th century and features its courtyard house system.

Traditional Suzhou houses are representative of the southern type of vernacular Chinese architecture. Compared with the northern type such as Beijing *siheyuan* (courtyard house), traditional Suzhou houses generally have smaller courtyards, called *tianjing* (lightwells or skywells), to admit less sunlight due to their hot summers and to collect rainwater. This small atrium space has been a vital feature in the design and construction of this region’s historic homes [Figure 3]^[1, 10, 11, 18, 19].

Like Beijing, Suzhou's old city walls also suffered tragedy where more than half have been demolished since the establishment of the People's Republic of China in 1949, with the remaining 1442 m, buried in houses and factories. In 2001–2005, the Suzhou municipal government rescued the city walls and made it a unique “riverside green corridor” [11].

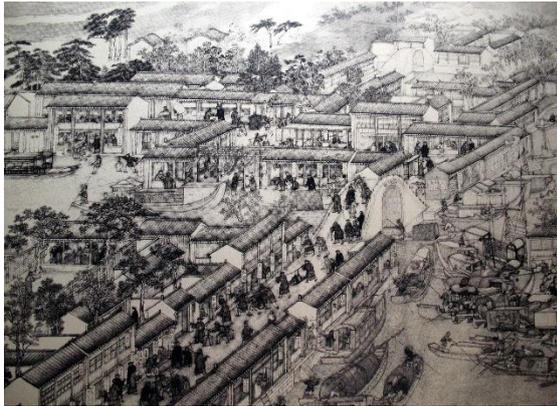


Figure 2. Partial scroll painting Gusu Fanhua Tu (“Suzhou Flourishing”) by Xu Yang in 1759 shows its courtyard house system. Source: Courtesy of Liaoning Museum

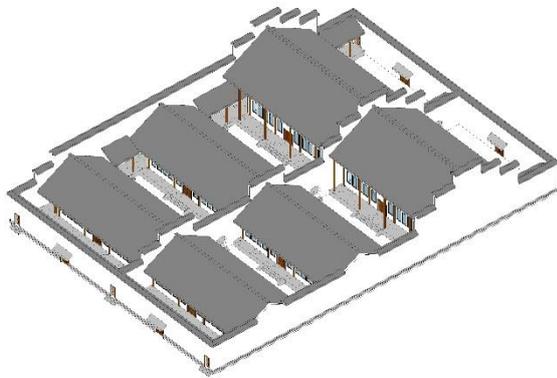


Figure 3. Traditional Suzhou courtyard house compound hosting a single-extended family. Source: Computer model by the author 2014

The Suzhou Master Plan 1996–2010 states that the city has “one body with two wings.” The body refers to the old city and the two wings are the two new satellite towns: The New District (developed in 1990) to the west, and the Industrial Park District (developed in 1994) to the east [5].

To preserve the old city, the Suzhou Municipal Government and Urban

Planning Bureau have established housing redevelopment principles as follows:

1. Maintain Suzhou's traditional planning and design such as white walls and black-tiled pitched roofs; building height should be mainly 2-3-storeys, some parts can be 3 ½ storeys to give a sense of level change; meanwhile, improve the quality of life;
2. Make maximum use of loft spaces and underground spaces to decrease building density, increase plot ratio, and increase green spaces;
3. Construct public buildings to accommodate Residents' Committees, senior's activity rooms, and kindergartens;
4. Maximize the use of existing conditions of a site such as the original street/lane network; conserve and renovate old houses in good condition; preserve old trees and wells on site; demolish and rebuild dilapidated houses;
5. Divide roads into three types: *xiang* (lane) 7 m, *nong* (alley) 3.5 m, and sub-alley not <2 m;
6. Make the ratio between building height to distance not <1:1;
7. Reach a financial balance between investment and profit, no more free housing; for those residents who do not purchase new housing but demand house ownership, they will be relocated to the New District;
8. Offer to the households social, environmental, and economic benefits as compensation for the use of their property for real estate development;
9. Concentrate bicycle parking, provide semi-basement garage;
10. Plant evergreens and fragrant flowers with bushes and arbors to create changes in level; tetrastigma should be planted inside estate walls to make gable walls green [20-24].

The Suzhou Old City Construction Office (1991/1992) has likewise supplemented new housing design and construction guidelines:

1. Carefully design each housing unit and strive to perfect residential functions; create large living rooms and small bedrooms; kitchens and bathrooms should be bright; interior spaces should be staggered and intricate; design some higher-standard units to satisfy different users' demands;
2. Save land and energy and utilize advanced and appropriate building technologies and fine building materials, components, and equipment;
3. Pay close attention to the organization of a supervisory team on construction sites; carefully select contractors; set up a complete construction schedule and management system to ensure the quality of construction.

Since the late 1980s, Suzhou has restored 54 inner-city neighborhoods with phased approach by combining modernization with conservation of the city's architectural and cultural heritage, preserving the exterior appearances, and improving infrastructure and interior functions. A special advisory committee was launched, including renowned planners and architects such as I.M. Pei, Wu Liangyong, Zhou Ganchi, and others. Attention was paid to the needs of the elderly, of mothers with young children, and other disadvantaged groups, daycare centers, kindergartens, primary schools, as well as recreational and sports facilities [3].

1.2. Case study: Jiaanbieyuan new courtyard-garden housing

Jiaanbieyuan (佳安别院 “Excellent Peace Courtyard-Garden Housing”) was built in the Canglang District of the old city of

Suzhou [Figure 4], in proximity to the main campus of Suzhou High School, the Confucius Temple, the Canglang (“Surging Waves”) Pavilion, and the Master-of-Nets Garden.

Originally, there was a factory on the site with low-lying terrain that needed remodeling. After redevelopment, Jiaanbieyuan has over 500 housing units in two types: 2-storey Chinese-style row/town/terraced houses, each with a small, private courtyard [Figure 5]; and 4-6-storey apartment buildings enclosed by low walls pierced by moon or flower gates on two sides [Figure 6]. There is a communal swimming pool, a tennis court, and a covered car park at ground level. The Central Garden was designed in the style of classical Suzhou gardens, and is the largest and most exquisite communal garden of all the new housing estates in the old city. The homeowners are mostly civil servants, teachers/professors, medical doctors, and business people.



Figure 4. Map of Suzhou showing the case location of Jiaanbieyuan new courtyard-garden housing (A6) in proximity to the Canglang (“Surging Waves”) Pavilion and the Master-of-Nets Garden. Source: <http://maps.mychinastart.com>

2. RESEARCH METHOD

The research used both quantitative and qualitative methods to examine the architectural, environmental, spatial, constructional, social, cultural, and behavioral aspects of the Jiaanbieyuan new courtyard-garden housing project. Data

included onsite surveys, interviews, time diaries, architectural drawings, photos, planning documents, conversation and observation notes, journals, real estate magazines, brochures, and related material, to achieve a comprehensive and holistic research method.

Because the research involved human participants, an ethics approval was obtained from Oxford Brookes University before embarking on the fieldwork in China. The onsite survey was carried out in October 2007. After negotiating with the property manager, the researcher was permitted to sit by the gate of Jiaanbieyuan for a week, to give out and collect survey questionnaires, and to observe the passers-by. In total, 44 surveys were collected from the residents. The 27 respondents who provided contact information enabled the author/researcher to later carry out semi-structured interviews with 14 residents, one with the project planner Liu Weidong ^[25], and another with the secretary of Suzhou City Planning Bureau, Qiu Xiaoxiang, by phone and via email in 2008. However, interviewing the project architect was impossible because he was from a Shanghai-based developer's company that had collapsed. No planning documents or architectural drawings on the project were collected because these files had never been submitted to the Suzhou Urban and Rural Construction Archives.

To put the interviewees at ease and encourage them to talk freely on sensitive issues, no tape-recording was used. Notes taken during telephone interviews were transcribed on the same day and translated into English by the author/researcher. On average, each telephone interview lasted about 23 minutes, with the longest spanning 50 minutes, and the shortest 10 minutes. The accompanying three tables show the demographic composition, education levels, and occupations of the sample population [Tables 1-3].

Table 1. Composition of residents in the study area (n=44)

Residents Information		Suzhou Jiaanbieyuan New Courtyard-Garden Housing Residents
Age (average)		52
Gender	Male	45%
	Female	52%
	Not known	3%
Marital status	Single	7%
	Married	84%
	Divorced/Widowed	2%
Years of residency (average)		6
Household size (average)		3.21

Source: Author's survey results

Table 2. Education level of residents in the study area (n=44)

Education Level	Suzhou Jiaanbieyuan New Courtyard-Garden Housing Residents
1. Primary School	2%
2. Junior Middle School	7%
3. Senior Middle School	9%
4. College Certificate	2%
5. College Diploma	9%
6. Associate Degree	23%
7. Bachelor's Degree	43%
8. Master's Degree	2%
9. Doctoral Degree	0%

Source: Author's survey results

Table 3. Occupations of residents in the study area (n=44)

Occupation	Suzhou Jiaanbieyuan New Courtyard- Garden Housing Residents
1. Legislators, senior officials and managers	9%
2. Professionals	39%
3. Technicians and associate professionals	11%
4. Clerks	18%
5. Service workers and shop and market sales workers	7%
6. Skilled agricultural and fishery workers	0%
7. Craft and related trades workers	0%
8. Plant and machine operators and assemblers	7%
9. Elementary occupations (e.g., street vendors, domestic helpers, cleaners and launderers, building caretakers, window and related cleaners, messengers, porters, doorkeepers, garbage collectors, etc.)	0%
10. Armed forces	0%
11. Other	5%

Source: Author's survey results

Onsite survey data were analyzed using SPSS. Frequencies were used as the basic measurement. Each interviewee was given a unique ID with his/her survey comments combined with interview data for content analysis using MS Word. With the interview data analysis, the author was particularly looking for issues related to the form and environmental quality, space and construction quality, social cohesion, and cultural activities associated with the project. Same/similar answers were

grouped together for manual calculation of the number of respondents.

3. FINDINGS

This section discusses findings of the study in relation to several key areas of concern: form and environmental quality, space and construction quality, social cohesion, and cultural activities.

3.1. Form and environmental quality

Jiaanbieyuan new courtyard-garden housing is located in a 9 m height restricted zone in the old city of Suzhou, with 3-storey buildings as the main form. Green spaces are cultivated between buildings, and each row/town/terraced house has a small, private courtyard. The planning and design have considered the functions of the layouts, adequate landscaping and greening, convenient transportation, and complete service facilities in the surrounding area (Liu Weidong, project planner, interview, 2008).

When asked, "*How does the form (such as exterior appearance, gate location, sunlight, ventilation, roof design, etc.) of the new courtyard-garden housing help or hinder your daily/cultural activities?*"

Eight of 14 (57%) interview respondents commented on the sunlight penetration, and nine (64%) of them talked about natural ventilation. Thus, it seems that these two are the most important factors in housing design. Only one said she preferred classical-style housing. Although the question was semi-structured, not many residents commented about their estate's exterior appearance. There was no complaint about their exterior walls, nor their roofs.

Jiaanbieyuan has two gates: North and South [Figure 7]. Each gate has been constructed in traditional Suzhou style and equipped with 24-hour security guards [Figure 8]. Several residents complained that the long and narrow site of the estate made it inconvenient to walk to public

amenities outside the estate because of the distances between individual household doors [Figures 9 and 10] and the two gates, and that having more gates in the east and west directions would have been helpful. The moon/flower gate on each side of the apartment buildings creates a peaceful green area and connects small and large spaces together [Figure 11].



Figure 7. Map of Jiaanbieyuan new courtyard-garden housing estate, Suzhou. Source: Photo by the author 2007



Figure 8. North Gate of Jiaanbieyuan new courtyard-garden housing estate, Suzhou. Source: Photo by the author 2007



Figure 5. Jiaanbieyuan Chinese-style row/town/terraced houses, Suzhou. Source: Photo by the author 2007



Figure 6. Jiaanbieyuan apartment buildings, Suzhou. Source: Photo by the author 2007



Figure 9. A doorway to a row/town/terraced house with a traditional vertical couplet that reads: “May the good fortune star forever shine on this peaceful home; may prosperity always come to this healthy and happy family.” The horizontal strip reads: “Welcome the bride and receive blessings.” This household is obviously occupied by newlyweds. Jiaanbieyuan new courtyard-garden housing, Suzhou. Source: Photo by the author 2007



Figure 10. Jiananbieyuan new courtyard-garden housing exterior, Suzhou. Source: Photo by the author 2007



Figure 11. A flower gate between apartment buildings in Jiananbieyuan new courtyard-garden housing, Suzhou. Source: Photo by the author 2007

3.1.1. Sunlight penetration and natural ventilation

Jiaanbieyuan was built in three phases. An interview respondent commented that the units built in the first and second phases are less ideal, and those in the third phase are better. Eight of 14 (57%) interview respondents said the sunlight penetration and natural ventilation are good from the ground/1st to the 4th/top floors, but the north side is gloomy and cold. Some residents specifically choose longer units in the north-south orientation for cross-ventilation. A resident noted that small and staggered windows reduce cross-ventilation. Another observed that ventilation is generally poor for the units in the middle of the buildings where the bathrooms have no windows that open to

the outside. Thus, north-facing window orientation, small building distance, and balconies on upper floors all affect the quality of sunlight in a room. Moreover, kitchens and bathrooms should have direct natural ventilation.

The Suzhou Building Code regulates that on the Great Cold Day (January 20–21, the 24th solar division), sunlight penetration should be not <2 h, and on Winter Solstice (December 21–22), sunlight penetration should be at least 1 h. At Jiananbieyuan, the ratio of building height to distance is 1:1.3, a design based on the Suzhou Planning Regulations for sunlight penetration. The size of the communal Central Garden was determined by the Suzhou City Planning Bureau that it should be not <1.5-2 m per person (Liu Weidong, project planner, interview, 2008). Seven of 14 interview respondents stated approvingly that they enjoyed good sunlight and natural ventilation. However, one observed that sunlight suffers for some units on the ground/1st floor, next to the 6-storey Suzhou High School that blocks the sun [Figure 12].



Figure 12. A semi-public courtyard at Jiananbieyuan in Suzhou. Note the over 6-storey adjacent building that can block sunlight. Source: Photo by the author 2007

3.1.2. Landscape design

Jiaanbieyuan was built in classical Suzhou garden style, with flowers and fruits all year round. The communal Central Garden's landscaping was carefully designed with a pavilion, fishpond,

corridor, moon gates, and bamboos [Figure 13]. Four of 14 (29%) interview respondents commented positively about the landscape design, and some go to the Central Garden to enjoy the flowers in the spring and autumn, and waterlilies in the summer. They walk around and talk to neighbors when they see each other. There is also space for sports and exercises.

Suzhou is a medium-sized city, the land value at the city center is very high. Developers hardly build this kind of housing estate in the old city of Suzhou anymore. Most of the demolished areas have turned into commercial districts, with multi-storey or high-rise apartment buildings, where the ground floor is for shops. One resident observed that, at Jiaanbieyuan, because the height of the buildings is maximum three storeys, it makes good outdoor spaces for human activities.



Figure 13. The communal Central Garden at Jiaanbieyuan new courtyard-garden housing, Suzhou. Source: Photo by the author 2007

3.2. Space and construction quality

Because people spend at least one third (8/24 h) of their time at home, spatial design and the quality of construction becomes paramount important. When asked, “*How does the space (interior and exterior) of the new courtyard-garden housing help or hinder your daily/cultural activities?*” Five areas of concern emerged: apartment layout, home sizes, floor levels, facility provision, and car park spaces.

3.2.1. Apartment layout

Seven of 14 (50%) interview respondents were satisfied with their apartment layouts. One recalled that they bought their apartment 10 years ago. At the time, the housing estate was a leading design. They have three bedrooms, two living rooms, and two bathrooms, as well as a loft space. Another said their master bedroom is very good, but the reading room/study is too small as it was converted from a bathroom, and their living room is also too small, even smaller than the bedroom. Two residents preferred more spatial divisions for practicality, especially more bedrooms if an elderly or a sick person needs a living-in nanny.

A fifth respondent said the layout of their top-floor apartment is not very good because the staircase leading to the loft space is right in the middle; it wastes space and is unable to place furniture. Moreover, an apartment with several staggered levels connected by steps makes it inconvenient to go between the floors.

A sixth respondent commented insightfully:

Compared with single-storey traditional courtyard houses, the multi-storey apartment buildings undoubtedly prevent residents’ daily activities. Previously when stepping out of the door, it was nature. Now we have lost contact with nature. We live on the 4th floor, it is relatively traditional; people living in high-rise buildings are even more separated from nature.

A seventh respondent said his family has a private courtyard of 45 sqm, the courtyard is a piece of sky and land belonging to themselves, and it is highly used [Figure 14]. After dinner, they take a walk in the courtyard. The balcony is also very useful. However, the ground/1st floor is damp; the house should be raised 50 cm above the ground.

In Suzhou, the ground-/1st-floor apartments are generally damp during

plum rains in June and July (in the middle and lower reaches of the Yangzi River), but these new houses are not raised above ground to block rainwater. While traditionally Suzhou has no basements because of a moist and humid climate, a resident observed that underground storage is still necessary for bicycles and household objects.



Figure 14. A private courtyard of a row/town/terraced house at Jiaanbieyuan new courtyard-garden housing, Suzhou. Source: Photo by the author 2007

3.2.2. Home sizes

Eleven of 14 (79%) interview respondents mentioned their home sizes. The smallest apartment is 87 sqm, and the biggest courtyard villa is 350 sqm. The average home size is about 160 sqm. Respondents generally observed that a unit of 90–120 sqm is sufficient for a 2-3-person household and 120–150 sqm is very satisfactory; they also found 150–180 sqm to be very spacious and 220–350 sqm very large. Thus, a unit of 90–180 sqm is generally a satisfactory interior space.

With regards to individual room sizes, the 14 respondents' comments are summarized as such. *Living room*: over 10 sqm is okay, 20 sqm is good, 30 sqm is fine, over 30 sqm is enough for holding classes at home, and 40–50 sqm is very big. *Reading room*: 12–15 sqm is fine. *Dining room*: 7–8 sqm is small, 10 sqm is fine for 4 people. *Bedroom*: 20 sqm is big. *Kitchen*: 3 sqm is small. *Bathroom*: 3 sqm is small. *Balcony*: 7–8 sqm is fine, where one can

place potted plants. However, due to the limited number of interview participants, these findings are only indicative.

One respondent let the author/researcher into their 350-sqm courtyard villa with a small but neatly planted garden, and then into their large, western-style living room, with the view of a corridor leading to the garage separated by a goldfish pond [Figure 15]. The owner seemed very satisfied with her home.



Figure 15. Traditional Chinese-style interior decoration in a Western-style spatial layout of a courtyard villa, Jiaanbieyuan new courtyard-garden housing, Suzhou. Source: Photo by the author 2007

3.2.3. Floor levels

Conventionally, Chinese people prefer to live on the ground/1st floor to be connected to earth energy (*jie di qi*). The Jiaanbieyuan survey results surprisingly show that most residents prefer to live on the 3rd floor (59%; $n = 44$), followed by the 2nd floor (41%), and 1st floor (34%). This finding is consistent with that of the Shilinyuan new courtyard-garden housing in Suzhou [26], as well as that of the Juer Hutong new courtyard housing in Beijing [27], likely due to the small courtyard sizes and short building distances that make lower floors having poorer quality of sunlight and air.

3.2.4. Facility provision

Planning regulations for Jiaanbieyuan mandate that basic services such as water, electricity, and gas, be provided (Liu Weidong, project planner, interview, 2008).

Respondents were generally satisfied with their facility provisions. However, one complained there is no air-conditioner in her reading room, it becomes too hot in the summer. Another said their toilet is often blocked, and they had to find contractors to repair it, as the property management does not deal with it. Yet another commented approvingly on the advanced kitchen design, as a chimney emits lampblack out to the roof.

3.2.5. Car park spaces

At the time of the survey in 2007, Jiaanbieyuan had about 500 households, each with 1–2 cars. The 40 parking spaces in the ground-level garage were certainly inadequate (Property Manager, interview, 2007). The developer later had to convert the property management building into a car park (Liu Weidong, project planner, interview, 2008). There are too many cars, which were underestimated at the time of design. Several respondents protested that the remaining cars have to park on both sides of the estate's alleys, leaving only one car width for walking, seriously affecting the environment and air quality. During the week of the survey, the author observed a severe traffic jam around 5–6 pm every evening when security guards directed a queue of cars at the North Gate. No matter how well-ventilated the houses can be, the incoming air is polluted by tail gas of cars, cigarettes, and so on.

3.3. Social cohesion

Traditional Chinese courtyard houses facilitate social interaction among the single-extended family members when they greet each other at the courtyard or the main hall. How does the Jiaanbieyuan new courtyard-garden housing function in this respect? In answering the survey question, “*Which space helps your relationship with other families in the courtyard-garden housing?*” Half of the respondents chose “public corridor” (50%; $n = 44$), closely followed by “courtyard” (48%).

During the subsequent interviews, when asked, “*How does the new courtyard-garden housing help or hinder you socialize/communicate with your neighbors?*” Two areas of concern emerged: spatial structure and neighborly communication, and the central garden and socialization.

3.3.1. Spatial structure and neighborly communication

Four of 14 (29%) interview respondents remarked that relations among nearby neighbors are harmonious, there is no quarrel or dispute, and they can negotiate problems that arise. When there is a childbirth or marriage, some of them send gifts, such as eggs dyed red (a Suzhou custom) and blessings. The newlywed would also give “candies of joy” to their neighbors. Old neighbors will also send cakes to those newly moved-ins, and many residents exchange gifts or home-cooked New Year food during Spring Festival.

However, seven of 14 (50%) respondents indicated that multi-storey apartment buildings are not as personal for facilitating warm communication and exchange among the neighbors as traditional courtyard houses or “big and mixed-yard” (*da za yuan*) compounds. In a traditional courtyard house, a stronger sense of trust and “one big family” was present where neighbors could meet, eat, and chat in the courtyard, which created opportunities to interact, communicate, and deep exchange. A respondent reflected: “I still miss the courtyard house from childhood: strong family ties, neighbors’ simplicity and honesty were readily demonstrated there. Now that people’s living conditions have improved, their opportunities to communicate actually become poorer.”

At Jiaanbieyuan, 12 of 14 (86%) interview respondents revealed that the neighbors seldom communicate, and that every household lives its own life behind closed doors, mainly because people are very busy with their work. If there is an

issue with neighbors, they will try to solve it through the property management. This situation has much to do with the spatial structure of the housing estate (4/14 respondents), which resulted in limited communication, while their physical living condition has been improved. Although they walk around the housing estate and talk with neighbors when they meet, these relationships are superficial and distant (9/14 respondents). Some respondents also noted the Chinese society is becoming impetuous; it does not lay emphasis on human relations. Thus, China's fast-paced economic development extracts a high social cost.

A couple recounted that they used to live in a 2-storey traditional courtyard house along the Ganjiang Street. In 1993 when the city was widening the street to make way for a major thoroughfare to accommodate more traffic, their house, which was their home for two generations and was still in perfect condition, was dismantled. The city compensated them ¥18,000 CNY (about \$2,820 USD) only. But the impact was enormous: many of their old neighbors passed away soon after that due to emotional and psychological attack.

Jiaanbieyuan was once safe and residents did not have to lock their doors at night. However, everyone now securely locks their doors because the social environment is more polarized, with many more thieves and burglars around. When all doors are locked, residents find it inconvenient to go in and out. Thus, good neighborly relations may be affected by residents' perception of socio-economic conditions.

3.3.2. Central garden and socialization

Jiaanbieyuan has a larger communal Central Garden than that of other new housing estates in the old city of Suzhou. Two of 14 interview respondents reported that some neighbors talk or chat in the Central Garden and the spaces between the buildings. Three respondents stated the

Central Garden is advantageous to social and cultural activities where the elderly residents exercise with others every morning with music on, and where children play under the adults' supervision. A security guard agreed that the Central Garden is frequently used by the elderly at around 6:30 am every morning, when a group of 20–30 (mostly) women exercise for 1.5–2 h. A respondent confirmed: "I have morning exercises in the Central Garden at 7:30–8:30 am almost all year round, about 10 of us retirees." Some residents sit or walk in the Central Garden daily except in July and August when it is too hot.

One mid-day in mid-October 2007, the author/researcher observed several parents/grandparents taking their children/grandchildren to the Central Garden, strolling and telling stories [Figure 16]. A few children were cycling or skipping (exercising) in the alleys. The property manager and a respondent indicated that, since the Central Garden is very dark at night, it is seldom used for gatherings. Another respondent said the Central Garden is so small that they prefer to stroll along the canal after dinner.

Unpleasant things could also happen in the Central Garden. Once a couple bought 600 goldfish with ¥3000 CNY (about \$470 USD) and donated 500 to the Garden pond. But the 500 fish were lost within 2 years. They then donated the rest 100, but those goldfish were also gone.

The same couple complained about being woken up once early in the morning by firecrackers let off by newly-rich neighbors from the countryside, who showed no concern for others, or for norms of civility upheld by most Suzhou citizens. Thus, social activities in communal courtyards or gardens are not shared by all residents, especially when socio-cultural differences are perceived. These dissimilarities may cause tension and resentment among neighbors.



Figure 16. Parents/grandparents watching their children/grandchildren play in the Central Garden, Jiaanbieyuan new courtyard-garden housing, Suzhou. Source: Photo by the author 2007

When homeowners purchased their housing units at Jiaanbieyuan, the developer promised to provide them with a community club. However, after the buildings were completed, the clubhouse was rented out to an outside organization. An outdoor swimming pool on top of the garage building has sat completely unused since the SARS epidemic (2003), and is very hot even for swimmers in the summer. As the estate tennis court charges a fee, it is neither used much nor well maintained (Property Manager, interview, 2007).

Nevertheless, one of 14 interview respondents managed to attend 1.5-2-h classes 3 times a week at the Seniors' College held at the Canglang District Community Center where classmates socialize after class. An aging population is a major phenomenon in China; social and cultural activities in the communities may benefit everyone's health and wellbeing, especially that of the elderly. Several residents suggested organized meetings in the communal Central Garden to counteract social isolation and to improve communication among the residents.

3.4. Cultural activities

In Suzhou in the past, scholars and artists would regularly meet in traditional gardens of private homes where they could actively

socialize, quietly contemplate, philosophize, study, compose and read poetry, paint, play chess and games, drink tea or wine, pick herbs for medicine, make elixirs in pursuit of immortality, and the like. Many of these fashionable pastimes were practiced well into the Song (960–1279), Ming (1368–1644), and Qing (1644–1911) dynasties [28]. Courtyard-gardens thus functioned as spiritual and material refuges and facilitated a cultured way of life.

However, with the passage of time and the technological development of the society, the survey findings indicate that current Jiaanbieyuan residents' focus at home is the television (66%; $n = 44$), followed by the computer (57%), their children (32%), and lastly, the dining table (30%). It shows that they have fully adopted modern technologies in their lifestyles today. As such, they have matched their Beijing counterparts [29].

During the subsequent interviews, when asked, "What is your major activity at home in an ordinary day? Which space do you use for this activity?" There were 13 of 14 (93%) respondents answered the question. Their daily indoor activities include watching television (8/13 respondents), reading books/newspapers (6/13), browsing the internet (5/13), doing homework (2/13), cooking (2/13), cleaning the house (2/13), washing clothes (1/13), chatting with family members (1/13), and sleeping (1/13). These activities were conducted in the living room (9/13), bedroom (6/13), reading room (4/13), or bathroom (1/13). Their daily outdoor activities include walking in the Central Garden (2/13) or the courtyard (1/13), watering flowers (1/13), feeding fish (1/13), practicing *qigong* (a system of deep breathing exercise) (1/13), playing *ping pang* (1/13), doing physical exercise (1/13), and doing grocery shopping (1/13).

The survey results show that the top three cultural activities the Jiaanbieyuan respondents conducted in the courtyard are maintaining health/natural healing,

gardening, and drinking tea [Table 4]. Moreover, the top two cultural festivities that they carried out in the courtyard are the Spring Festival and the Mid-Autumn Festival (or Moon Festival) [Table 5].

Table 4. To what extent do you or your family use the courtyard to do the following cultural activities, if any? (n=44)

Cultural Activities in the Courtyard	Mean (1-5)
1. Maintaining health/natural healing	3.41 (n=32)
2. Gardening	4.09 (n=22)
3. Drinking tea	3.68 (n=22)
4. Playing games	3.71 (n=14)
5. Dancing	2.73 (n=11)
6. Composing poetry or article	3.25 (n=8)
7. Holding birthday party	3.71 (n=7)
8. Playing musical instruments	2.56 (n=9)
9. Practicing calligraphy	2.33 (n=9)
10. Doing painting	2.43 (n=7)
10. Holding wedding ceremony	2.43 (n=7)
11. Singing traditional operas	2.14 (n=7)
12. Other, please specify:	5.00 (n=3)

Source: Author’s survey results

In the subsequent interviews, when asked, “*What traditional Chinese cultural festivals do you celebrate at home and how do you celebrate them?*”

Table 5. To what extent do you or your family use the courtyard to do the following cultural festivities, if any? (n=44)

Cultural festivities in the courtyard	Mean (1-5)
1. New Year’s Day (Solar New Year)	2.44 (n=9)
2. Spring Festival (Lunar New Year, 1st day of the 1st lunar month)	3.74 (n=19)
3. Lantern Festival (Spring Spirit Festival, 15th day of the 1st lunar month)	3.54 (n=13)
4. Qing Ming Festival (Clear and Bright Day, or Tomb-Sweeping Day, April 5, or April 4 in leap years)	2.14 (n=7)
5. Dragon Boat Festival (5th day of the 5th lunar month)	3.00 (n=8)
6. Mid-Summer Spirit Festival (Ghost Festival, 15th day of the 7th lunar month)	2.00 (n=6)
7. Mid-Autumn Festival (or Moon Festival, 15th day of the 8th lunar month)	4.20 (n=15)
8. Double Ninth Festival (9th day of the 9th lunar month)	3.00 (n=7)
9. Winter Solstice Festival (December 21-22)	3.00 (n=7)

Source: Author’s survey results

The Spring Festival is the most celebrated (14/14 respondents), during which time they would display new calendars and decorate their homes with traditional ornaments such as the characters 喜 (*xi* for “joy”) and 福 (*fu* for “good fortune” or “happiness”) (7/14), spring couplets (6/14), New Year’s posters (4/14), lanterns (4/14), and Chinese knots (2/14). They normally have a family reunion dinner (8/14) at home or in a restaurant. After coming home on the New Year’s Eve, they would watch CCTV’s Spring Festival Gala until 12 o’clock midnight, and then let off firecrackers (4/14) in the courtyard to expel evil. They would also worship their ancestors before the New Year or go to Buddhist temple

with their family members and burn joss sticks, while others may travel to different places (2/14).

Four of 14 (29%) interview respondents celebrate the Qing Ming Festival (April 5 or April 4 in leap years) by going to sweep their ancestral tombs.

Two of 14 (14%) interviewees celebrate the Start of Summer (May 5–7, one of the 24 solar divisions), when they would hang wormwood on door panels, eat salted duck eggs, and hang a string bag holding a salted duck egg on the neck of a child to expel evil.

Four of 14 (29%) interview respondents celebrate the Dragon Boat Festival (originally derived from the Summer Solstice, June 20–21), when they would go to visit their parents and eat *zongzi* together.

Mid-Autumn Festival (initially associated with the Autumn Equinox, September 21–24) is the second most celebrated festival (8/14 respondents), when they would gather for a family reunion dinner and eat moon cakes (6/14). If the weather is fine, they would observe the full moon in the night sky (3/14). Customarily, if the household has a courtyard, they would place a table in it, on top of which would be five plates, in which there are seeds, candies, and lotus, to offer to the moon goddess (lotus symbolizing the purity of the moon). If the household does not have a courtyard, the family would place a table in their balcony or in front of their gate, or go somewhere outdoors that has a big open space to enjoy the full moon. Others may take a “moon walk” (*zouyue*) along the long corridor by the canal encircling the city, or row a boat to somewhere without visual obstacles to enjoy the full moon.

Seven of 14 (50%) interview respondents celebrate the Winter Solstice Festival (December 21–22), when they would gather for a family reunion dinner, with New Year’s cake and lamb cake, while others would also worship their ancestors. Winter Solstice Festival in

Suzhou is like the Western Halloween; it is to commemorate the departed.

One respondent commented: “Now the quality of life has improved; every day is like a festival, it is very easy and convenient to buy anything. There are only things you cannot think of, but nothing you cannot buy.” Thus, the improved quality of life may contribute to a lesser extent of festival celebrations than that in the past.

As community/city parks/gardens [Figures 17 and 18] are more publicly accessible than the courtyards, the survey shows that they have become the most common sites for cultural activities (43%; $n = 44$), followed by balcony/roof terrace (18%).



Figure 17. The zigzag corridor by the water at the Canglang (“Surging Waves”) Pavilion near Jiaanbieyuan, Suzhou. Source: Photo by the author 2007



Figure 18. The “Moon Comes with Breeze Pavilion” at the Master-of-Nets Garden near Jiaanbieyuan, Suzhou. Source: Photo by the author 2007

4. CONCLUSION

This in-depth case study investigated the Jiaanbieyuan new courtyard-garden housing built in Suzhou in 1998. It explored the architectural, environmental, spatial, constructional, social, cultural, and behavioral aspects of the housing, to see whether it is culturally sustainable, and whether it facilitates residents' traditional cultural expressions.

Based on the quantitative and qualitative data collected mainly through onsite surveys and semi-structured interviews, the findings suggest that communal courtyards foster social interaction and private courtyards facilitate self-cultivation. The communal courtyards help sustain some traditional Chinese cultural activities. The primary function of a communal courtyard is to maintain health/natural healing. However, many cultural activities are much less or no longer partaken in the communal courtyards, likely due to such factors as time, climate, courtyard ownership, yard size, facilities, and so on. Moreover, community/city parks/gardens have become important places for cultural activities in China.

The findings also reveal that neighborly relations are partly influenced by the form and space of the courtyard housing, and partly by a changing and polarizing society, socio-economic differences, modern lifestyles, common language, and the cultural background of the residents, among others.

5. RECOMMENDATION

Based on the research findings, the author has proposed a new courtyard-garden housing system that encourages social interaction and cultural activities for ordinary citizens and middle-income families in Suzhou [Figures 19 and 20], which may have broader implication.



Figure 19. Proposed new courtyard-garden housing system accommodating four nuclear families. Each unit is 180 sqm on three levels above the ground. Source: Design and cardboard model by the author 2012



Figure 20. Proposed new courtyard-garden housing system accommodating four nuclear families. Each unit is 180 sqm on three levels above the ground. Source: Zhang (2016, 2017) [4, 30]

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CONFLICT OF INTEREST

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