Nanchizi New Courtyard Housing in Beijing: Residents’ Perceptions and Experiences of the Redevelopment

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Citation: Zhang D, 2020, Nanchizi New Courtyard Housing in Beijing: Residents’ Perceptions and Experiences of the Redevelopment. Journal of Chinese Architecture and Urbanism, 2(2): 1021. http://dx.doi.org/10.36922/jcau.v2i2.1021

ABSTRACT

Cultural sustainability is the theoretical framework for this study, which investigates Nanchizi (“South Pond”) new courtyard housing experimental project constructed in Beijing, China, in 2003. It is located in a traditional courtyard house neighborhood right to the east of the Forbidden City, in a culturally and politically sensitive area that the initial scheme had even caught the attention of UNESCO. The redevelopment project has restored numerous single-storey traditional courtyard houses that were in relatively good condition, demolished those in poor condition, and rebuilt two-storey new courtyard housing units with modern facilities and shared courtyards whose style and features resemble some aspects of Beijing siheyuan. This 2007-2008 onsite survey and semi-structured interviews with residents, project architect, and lead developer critically examine this approach to historic preservation in China. The findings reveal that communal courtyards promote social interaction and private courtyards facilitate cultural activities, despite some issues raised by the residents, including irrational unit design and poor construction quality, among others. The study attempts to offer valuable lessons and proposes a new courtyard garden house design template for discussion and future practice.

Keywords: courtyard house, courtyard housing, cultural sustainability, architectural culture, China

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1. INTRODUCTION
Academics generally acknowledge that sustainable development is formed of four pillars: environmental responsibility, economic viability, social equity, and cultural vitality. The origin of the word ‘sustainability’ is from the Latin sustinere (tenere, to hold; sus, up). Dictionaries provide more than 10 explanations for ‘sustain,’ the main ones are to ‘maintain,’ ‘support,’ or ‘endure’ \[1, 2\].

Since the 1980s, sustainability has been applied more in terms of human sustainability on the earth, resulting in the most widely cited definition of sustainable development, that of the Brundtland Report, Our Common Future, published by the World Commission on Environment and Development: “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” \[p. 8\] \[3\]. Since then, the concept has developed and was presented in the Rio Declaration on Environment and Development, also known as the Rio Earth Summit \[4\] that states, “The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations” \[article 3\] \[4\].

However, the above definition is not globally accepted and has undergone various interpretations \[5-7\]. The 2005 World Summit admits that sustainability requires the resolution of environmental, social, and economic demands known as the ‘three pillars’: environmental responsibility, economic viability, and social equity \[8-10\]. The United Cities and Local Governments \[11-16\] share the vision that culture is the fourth pillar of sustainable development, a notion popularized by Jon Hawkes’ book The Fourth Pillar of Sustainability: Culture’s Essential Role in Public Planning \[17\] to square the sustainability triangle. Sustainability has now been commonly recognized as having four pillars, including cultural vitality.

Scholars such as Darlow \[18\] and Wheelwright \[19\] have witnessed that sustainable development is mostly a cultural mission since it seeks a change in attitudes and lifestyles. Judy Spokes, the executive officer of Cultural Development Networks, states that “Culture is both overarching and underpinning” \[p. 3\] \[17\]. As such, Brand \[20\] and Nurse \[21\] maintain that culture should be positioned at the front and center of the sustainability framework and completely integrated into the other three pillars because it is a foundation for interrogating the proposition and practice of sustainable development at its hub. Creative City Network of Canada likewise contends that “Culture is a core dimension of vibrant and sustainable communities” \[p. 1\] \[22\] because the appeal of a place is inseparable from its traditions and culture as they are lived and expressed in the activities and social life of the community; this quality of a city is one of the most striking features for making it a desirable place to live, work, study, or visit.

Cultural sustainability is the theoretical framework of the study because it regards architecture as a cultural artifact, and evaluates both archi-cultural and socio-cultural aspects of courtyard housing in China. This paper defines cultural sustainability 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. It encompasses such notions as cultural vitality, cultural diversity, and cultural activities \[23\].

Chinese people have lived in courtyard houses for several thousand years. The earliest courtyard house unearthed by archeologists so far was built during the Middle Neolithic period, represented by the Yangshao culture (5,000–3,000 BCE) \[24\]. The ancient Chinese favored this housing form because enclosing walls helped maximize...
household privacy and protection from wind, noise, dust, and other threats; and the courtyard offered light, air, and views, as well as acting as a family activity space when weather permitted. A traditional Chinese courtyard house would typically host an extended family of three to four generations [23, 25-27].

1.1. Beijing City Planning
Beijing (literally “Northern Capital”) as a city has a history of over 3,000 years, and as China’s capital for over 860 years. Beijing was initially a planned city applying principles described in the Record of Trades in Rituals of Zhou (《周礼•考工记》), with a 7.8 km north-south central axis denoting the greater axis from Heaven to Earth, and the Purple Forbidden City, home of 24 emperors from the Ming (1368–1644) and Qing (1644–1911) dynasties, located at the center. The Palace City was enclosed on four sides by the Imperial City, which was further enclosed on four sides by the outer City Walls. Beijing’s Inner City has a grid pattern like a chessboard. Until recently, inner Beijing was divided into four quarters: Eastern District, Western District, Chongwen District (merged with Eastern District in 2010), and Xuanwu District (merged with Western District in 2010).

Classical courtyard houses of Beijing, commonly known as siheyuan, had been the city’s primary architectural form since antiquity, as this housing form complies with Chinese cultural traditions and cosmology [23, 25-32]. However, due to numerous factors, siheyuan have undergone gradual decay and massive demolition in the 1990s. To protect this architectural heritage, the Beijing Municipal Government has experimented with two new courtyard housing prototypes in the inner city. The first is at Juer Hutong (菊儿胡同 “Chrysanthemum Lane”) [33] constructed in 1994, and the second is at Nanchizi (南池子 “South Pond”) completed in 2003.

In 2002, the Conservation Plan of Historic and Cultural City of Beijing was initiated that provided more detailed guidelines for the conservation of traditional courtyard houses and designated 25 patches protected status [34]. Nine articles deserve special attention in this study:

1. Conservation and renewal of dilapidated courtyard houses must take the courtyard as the basic unit; damage should not be made to the original courtyard system and hutong structure (article 5.2.4);
2. The form and color of new buildings in the old city must comply with the overall style and features of the old city (article 15.0.1);
3. New multi-storey housing in the old city must be built with pitched roofs; existing multi-storey housing that has flat roofs must be changed to pitched roofs (article 15.0.2);
4. For the housing with pitched roofs in the old city, the color of the roof tiles must comply with traditional grey tone; it is prohibited to apply glazed tile roofs indiscriminately (article 15.0.3);
5. For dilapidated courtyard houses in the conservation zones, the renewal must gradually restore their traditional style and features (article 17.0.2);
6. Land development in the old city should be combined with conservation and renewal in the imperial city, and reduce population density in the conservation zones (article 9.3.3);
7. Granting permission for constructing 3-storey or higher buildings that are in disharmony with traditional style and features of the Imperial City should be stopped (article 9.3.4);
8. The height of new buildings in the conservation zones must be restricted according to the height control, and inserting high-rise
buildings in-between should be strictly prohibited (article 13.0.2);

9. Feasible measures and adjustments (including financial methods) to restrict the overuse of private cars in the old city should be adopted (article 11.1.4) \[34\].

1.2. Case study: Nanchizi new courtyard housing

The Nanchizi new courtyard housing occupies a land area of 6.39 hectares in Beijing’s Imperial City in the east of the Forbidden City, around the Pudusi (Buddhist) Temple, and in proximity to the Cultural Palace, the Changpuhe Park (“Calamus River Park” or “Iris River Park,” b. 2002) \[35\], and the Imperial City Walls [Figures 1-3]. The site was originally occupied by royal warehouses. After 1911, the quarter was built with ordinary single-storey courtyard houses without service facilities \[34, 36, 37\].

Figure 1. Map of Beijing showing the case location of Nanchizi new courtyard housing (A2) adjacent to the Forbidden City. Source: https://www.orangesmile.com/common/img_city_maps/beijing-map-4.jpg

Before redevelopment, the houses’ timber structures were rotten and roofs leaking; many houses posed safety issues. The infrastructure was poor and the drainage was often blocked; only a few hutong (lanes) were provided with running water and electricity but without a heating system or natural gas; coal-burning had caused much pollution and brought many inconveniences to the residents. Public toilets in the hutong were over 100 m away for many households. Of the 17 hutong around Nanchizi, most were less than 5 m wide and some were a dead-end,

Figure 2. Beijing Nanchizi area map in the Qianlong period (1736–1795); it shows a clear courtyard pattern with Pudusi Temple at the center. Source: Wang S. 保护历史文化街区的价值取向原则—兼议南池子保护试点工程 (Discussion on protecting pilot project of Nanchizi [sic]). 《北京规划建设》Beijing Planning Review, 2004, 2: 106

Figure 3. Nanchizi neighborhood gate. Source: Photo by the author 2007
the self-built extensions further narrowed the *hutong*, making them impossible for fire engines or ambulances to drive through in case of emergency [34].

Nevertheless, the area lived 1060 households in 600 dilapidated courtyard compounds, with a density of 480 persons/ha [36]. For historic preservation, a large number of the original residents had to relocate elsewhere. The new building height was restricted to less than 6 m and to maintain the original architectural scale, form, color, materials, roof shape, and so on, of the surrounding historic buildings, and to ensure the continuity of the existing urban pattern while establishing a service network system [34, 36, 38]. Thus, conserving the courtyard structure and traditional housing style, and building new housing compatible with the old, were municipally endorsed [39, 40].

The renewal and redevelopment of Nanchizi was to fulfil basic living requirements of ordinary citizens in the area, with its spatial design based on the National Building Standards at the time (2002–2003). Each house/housing unit has its own kitchen, bathroom, dining room, and bedroom(s). With a fixed plot ratio, each unit has the minimum interior space of 45–75 sqm set by the Standards and household size. Nevertheless, the present condition is a major improvement over previous ones on site.

Because Nanchizi new courtyard housing was the first of its kind built in a historic and cultural conservation site, it has been the focus of attention and aroused many social debates. Those who were against redevelopment mostly came from cultural circles embracing nostalgia. Many residents who lived in dilapidated courtyard houses desperately wanted redevelopment to improve their living conditions. In Nanchizi lived some leaders of the central authorities, who said before redevelopment that the area was too old and shabby, and that immediate improvement was necessary. Since the site is next to the Forbidden City, the Beijing City Planning Committee sent a delegate to UNESCO to explain and ensure that the new buildings would be in harmony with the Imperial Palace.

The project has completely restored the Pudusi Temple, preserved nine *hutong*, renovated 31 *siheyuan* that were in good condition, reconstructed 17 *siheyuan* based on their original layouts, and maintained 64 Arbor trees. It has also built 301 numbers of two-storey Chinese-style new courtyard housing units clustered in 49 compounds (*sihelou*, meaning “buildings with four-sided enclosure”); most of the new courtyards are shared by 4–15 housing units [41] (only a few single-family ones) [42]. Municipal service facilities (running water, gas, electricity, drainage, telecommunication, underground parking, etc.) have been provided [36, 43]. The *hutong* were widened and some opened up for fire engines and ambulances and for burying service pipes. Planning regulations required to have 30 percent returning households, but only 27 percent (290/1060) original families could afford to return, the rest had relocated elsewhere [Table 1] [34, 36].

### 2. RESEARCH METHOD

This in-depth and detailed case study has used “combined strategies” [44] or a “mixed method” [45] where both qualitative and quantitative data collection and analysis were carried out, to explore the intricacy of the issues, and to obtain sensitivity about the context, process, and causations. The architectural-cultural study as a branch of humanities and social sciences may be enhanced by the execution of a greater number of good case studies [46]. Moreover, the research took the six approaches to vernacular architecture [47]: architectural, historical, aesthetic, spatial, anthropological, and behavioral. Data collection included onsite surveys, interviews, observations, drawings, photos, among others. As the research involved human participants, an ethics approval was obtained from Oxford Brookes University.
Table 1. Comparison of before and after Beijing Nanchizi new courtyard housing redevelopment

|                                      | Before Redevelopment | After Redevelopment | Notes | Comparison |
|--------------------------------------|----------------------|---------------------|-------|------------|
| Land use                             | 6.39 hectares        | 6.39 hectares       |       |            |
| Floor area                           | 30,000 sqm           | 40,400 sqm          |       | Increased |
| Plot ratio                           | 0.47                 | 0.63                |       | Increased |
| Built-up area                        | 27,000 sqm           | 26,600 sqm          |       | Decreased |
| Building density                     | 42.3%                | 41.6%               |       | Decreased |
| Number of households                 | 1060                 | 356 (of which 270 returning households) | Including protected courtyard houses, renovated courtyard houses, and 2-storey new courtyard housing | Decreased 70% |
| Number of residents                  | 3038                 | 1536                |       | Decreased 50% |
| Population density                   | 475 persons/ha       | 240 persons/ha      | Including commercial land use | Decreased 50% |
| Number of rooms                      | 2179.5               | 1908                | Excluding Pudusi Temple | Decreased |
| Number of courtyard compounds        | 192                  | 103                 | Including protected courtyard houses, renovated courtyard houses, and 2-storey new courtyard housing | Decreased |
| Road area                            | 0.78 hectare         | 1.08 hectare        |       | Increased |
| Eave height                          | Lowest 3m (99.98%);  | Lowest 3m (30%);    | Excluding Pudusi Temple |       |
|                                      | Highest 9m (0.01%)   | Highest 6m (70%)    |       |            |
| Green area ratio                     | No green area due to ad hoc extensions | 25% |       | Increased |

Source: Author’s update and translation based on existing literature [36, 37]

Nanchizi fieldwork was conducted in November 2007. Local authority allowed me to contact individual households with a questionnaire for collection. While several residents filled one out instantly, some courtyard compounds designated a leading resident to distribute surveys to neighbors and batch collected them for my return a week later.

At Nanchizi, 71 questionnaires (9 from foreign residents) were collected. The 39 respondents who provided contact information enabled me to later carry out semi-structured interviews with 16 residents by phone and via email in 2008: 5 of them were foreigners residing in Beijing, one interview with the project...
architect, Lin Nan [48], and another with the lead developer [49].

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 researcher/author. On average, each telephone interview lasted about 28 minutes, with the longest spanning 75 minutes, and the shortest 10 minutes. The accompanying three tables show the demographic composition, education levels, and occupations of the sample population [Tables 2–4].

Table 4. Occupations of residents in the study area (n=71)

| Occupation                                           | Beijing Nanchizi New Courtyard Housing Residents |
|------------------------------------------------------|-------------------------------------------------|
| 1. Legislators, senior officials and managers         | 7%                                              |
| 2. Professionals                                     | 18%                                             |
| 3. Technicians and associate professionals            | 8.5%                                            |
| 4. Clerks                                            | 13%                                             |
| 5. Service workers and shop and market sales workers  | 10%                                             |
| 6. Skilled agricultural and fishery workers           | 0%                                              |
| 7. Craft and related trades workers                   | 3%                                              |
| 8. Plant and machine operators and assemblers         | 14%                                             |
| 9. Elementary occupations (e.g., street vendors,     | 0%                                              |
|   domestic helpers, cleaners and launderers, building |
|   caretakers, window and related cleaners, messengers,|
|   porters, doorkeepers, garbage collectors, etc.)     |                                                 |
| 10. Armed forces                                     | 0%                                              |
| 11. Other                                            | 17%                                             |

Source: Author’s survey results

Table 2. Composition of residents in the study area (n=71)

| Residents Information | Beijing Nanchizi New Courtyard Housing Residents |
|-----------------------|-------------------------------------------------|
| Age (average)         | 52                                              |
| Gender                | Male 45%                                        |
|                       | Female 48%                                      |
|                       | Not known 7%                                    |
| Marital status        | Single 11%                                       |
|                       | Married 66%                                      |
|                       | Divorced/Widowed 4%                              |
| Years of residency    | 3.4                                             |
| Household size (average) | 3.4                                   |

Source: Author’s survey results

Table 3. Education level of residents in the study area (n=71)

| Education Level | Beijing Nanchizi New Courtyard Housing Residents |
|-----------------|-------------------------------------------------|
| 1. Primary School | 4%                                              |
| 2. Junior Middle School | 13%                              |
| 3. Senior Middle School | 11%                                      |
| 4. College Certificate | 0%                                         |
| 5. College Diploma | 14%                                             |
| 6. Associate Degree | 11%                                           |
| 7. Bachelor’s Degree | 17%                                   |
| 8. Master’s Degree | 13%                                            |
| 9. Doctoral Degree  | 4%                                             |

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 architectural form, spatial layout, social relations, and cultural activities/festivities associated with the project.
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
As the Nanchizi area has a height restriction of 6 m to the eaves, most of the new courtyard housing has 2 storeys, with 3 storeys only in some parts that are still within the 6 m height limit to create differences in roof levels. From the developer’s point of view, the key to the project’s success lies in the achievement of maximum building height and plot ratio (1:1.6) within the planning regulations (Lead Developer, Interview, 2008).

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

Seven of 16 interviewed residents commented positively that the form looks fine and splendid, that it has maintained the style and features of the ancient capital and traditional siheyuan that turns one storey into two storeys, and that it allows people a taste of the small courtyard house’s lingering charm. However, six residents argued that although the environment has been transformed, it cannot really be called a “courtyard house” because the shape of each yard is different. They also contended that it is a new “mixed-yard” that has destroyed the traditional siheyuan layout, and that when combining Chinese and Western architectural styles, the design looks “neither fish nor fowl.”

At Nanchizi new courtyard housing, each front gate is accessed by the control of a swipe card [Figure 4]. A resident criticized the absence of individual door bells and mail boxes, which made it difficult to invite guests or receive mail. One not only had to take time to give visitors directions, but also needed to run out in all weather conditions to open the gate for them. And often, delivered mail got lost.

Since there is no barrier-free access, some households have to make one themselves. Each courtyard compound has an emergency exit, and every household has its own doorway. However, a resident complained that the fire exit next to her unit was often used as a regular gate, disturbing her peace.

Seven of 16 interviewed residents observed that their French windows upstairs provide good light and ventilation; one resident also noted that it meets the government regulation of minimum 2 h of sunlight every day. However, four residents complained their units are not well ventilated because the buildings are built back-to-back without rear windows. Two residents also said that French windows, uncommon in northern China, are less desirable because they bring in cold in the winter while standard casement windows would have been more functional.
In Beijing, the summer afternoon sun is so strong that it can be a problem for people living in west-facing units, but some residents said their sunshades for west-facing windows were missing. Without verandas, rainwater also comes directly through the frames of doors and windows.

The Nanchizi new courtyard housing was designed with 49 new courtyard compounds, each shared by 4–6 households (Lin Nan, Project Architect, Interview, 2008). However, the survey shows that the actual number of households sharing a new courtyard is 4–15, with the average of 7 households sharing a courtyard [Figures 5 and 6]. The distances between buildings are 7–9 m. Two of 16 interviewed residents were critical that their courtyard is too small for meaningful functions, and that insufficient sunlight makes their home a less desirable place to be. Yet, two other residents felt that the boundary between public/private areas is unclear. One also commented on a lack of privacy because her front windows and the neighbors’ directly face each other.

To achieve the same amount of sunlight as in a classical Beijing siheyuan, the ratio of building height to courtyard width must be at least 1:3 [23, 27, 30, 31, 50]. This would mean a minimum width of 18 m if the surrounding buildings are 6 m high. The building distances of 7–9 m at Nanchizi clearly did not meet this criterion, and residents could not make adequate use of the small outdoor spaces provided.

![Figure 5](image5.png)

Figure 5. A new courtyard at Beijing Nanchizi. Source: Photo by the author 2007

Regarding the condition of the new courtyards, three of 16 interviewed residents remarked that it is neat and tidy, that it is good for humans to be in touch with nature, and that it helps to preserve some of Beijing’s living traditions. Nevertheless, several residents complained that some new courtyards’ landscaping is poor, and there are too many hoarded odds and ends, and that it is visually unattractive. Unruly pets also run around and void themselves everywhere, leaving the courtyard in poor hygiene. The residents suggested a common outdoor storage room, such as a greenhouse for plants and flowers in winter, to help organize the yard space or it will turn into a new “chaotic-yard.” While inadequate drainage pipes in the courtyard cause stagnant rainwater, outdoor lighting in the courtyard for night-time users is absent, despite being essential for the residents who come home late.

The Nanchizi new courtyard housing combines pitched roofs with flat ones to express level alternation to enrich the urban scene, when the fixed plot ratio does not allow the design to reduce the floor numbers (Lin Nan, Project Architect, Interview, 2008). It should be pointed out that although some buildings in classical Beijing siheyuan had flat roofs, these were used only as service rooms; all the
buildings for human habitat had pitched roofs \cite{25,26}.

Seven of 16 interviewed residents indicated that flat roofs are not as functional as pitched ones because their units are hot in the summer and cold in the winter, with a temperature difference as much as 3º – 4ºc between the ground/1st and 2nd/top floors. One resident noted that visually, flat and pitched roofs built side-by-side are unsymmetrical and unaesthetic [Figure 7]. Moreover, the roof tiles have been insecurely glued on with mortar continually falling off, losing the roof’s protective status. Furthermore, the eaves are shallow with rainwater slanting in, as traditional eaves were typically 60 cm for blocking rainwater.

However, six of 16 interviewed residents observed that the layout lacks rationality and each unit has a different design. Twenty of 71 survey respondents criticized the rooms in a 2-storey unit of 45–60 sqm for being too small, and the kitchen and bathroom with a staircase leaving only a passageway but hardly any hall on the ground/1st floor, with almost no space for a dining table [Figures 8-10]. In some units, the living room’s width makes it difficult to accommodate a TV, and many units have no living room at all. The staircase is also too narrow, steep, unsafe, and uneasy for moving furniture (12/16 respondents) [Figure 11].

![Figure 7. A flat roof at Nanchizi new courtyard housing: the lack of eaves allows rainwater to slant in and the rooms are hot in the summer. Source: Photo by the author 2007](image)

**3.2. Space and construction quality**

When asked, “How does the space (interior and exterior) of the new courtyard housing help or hinder your daily/cultural activities?”

Three of 16 interviewees commented that their living condition has been improved compared with that in dilapidated traditional courtyard houses on site because now there is a kitchen and a bathroom in each housing unit. Although a few residents initially felt uncomfortable about the 2-storey interior space, they have adapted to it.

![Figure 8. Downstairs of a 1-bedroom unit with Western-style interior space, Beijing Nanchizi new courtyard housing. Source: Photo by the author 2007](image)

![Figure 9. Upstairs of the same 1-bedroom unit, where the residents combine the bedroom with an office, Beijing Nanchizi new courtyard housing. Source: Photo by the author 2007](image)
Another resident suggested that to alleviate the problem of tight living space, a basement should have been built.

Five of 16 interviewed residents indicated that living on the ground/1st floor is better for the elderly, and a 2-storey house is inconvenient for the elderly and physically impaired. One resident said he liked sleeping downstairs more than upstairs, perhaps because of having previously lived in a traditional single-storey courtyard house for 25 years.

The study further suggested that an interior space of 120–180 sqm per unit for a three- to four-person household is generally satisfactory \(^{23, 31}\). Moreover, the survey results showed that, for practical reasons, most residents preferred to live on the ground/1st floor (82%; \(n = 71\)), and the 2nd floor (42%), rather than on higher levels.

Seven of 16 interviewed residents noted that the quality of construction is generally poor; it was hastily completed without much attention to details in workmanship. They criticized the exterior walls for their poor thermal insulation, and the houses were cold in winter and hot in summer [Figure 12]. Two residents noted the exterior walls were damp when heating was switched on in winter as there was a high degree of moisture in them [Figure 13]. Moreover, four residents complained that paint peeled off the walls and water seeped through the corners.

The kitchen and bathroom are too small (7/16) as the bathroom is only 1–2 sqm with no room to turn around for taking a shower or installing a washing machine. The lack of a bathroom upstairs creates inconvenience at night, especially for the elderly. The staggered layouts are dysfunctional as it is spatially inefficient and uncomfortable (6/16). Lastly, there is no balcony for drying laundry (2/16). A resident describes this inconvenience:

> The space inside is generally cramped. In the beginning, I found it kind of quaint, but as years went by, I got tired of bumping into things all the time. I would never buy a house such as one in Nanchizi. The only value these houses have is their location. The entire interior is an architectural failure.

Figure 10. A kitchen with modern stove in a 1-bedroom unit, Beijing Nanchizi new courtyard housing. Source: Photo by the author 2007

Figure 11. A crudely constructed staircase, Beijing Nanchizi new courtyard housing. Source: Photo by the author 2007

Figure 12. A cold-prevention method invented by a resident at Nanchizi new courtyard housing. Source: Photo by the author 2007
The iron doors and windows are not airtight and rain leaks into the unit (2/16 respondents), with poor sound insulation in a location so close to the Nanchizi Street (3/16). Two residents showed a preference for doors and windows made of wood. Moreover, as the window glass is made of deficient materials to reduce the construction cost, it is thin and traps water vapor between the double-glazing in the winter, fogging it up and making it impossible to clean [Figure 14].

Three of 16 interviewed residents observed that although the new housing fulfils their needs for basic living facilities, the heating system uses wall-mounted units that not only waste energy in the winter, but also are not warm and are more costly. Two residents requested to have their houses rebuilt. A resident writes:

Nanchizi was admittedly an architectural failure that local government officials have apparently acknowledged. That is why Beichizi has not been rebuilt the same way (this had been the original plan). If you actually live in one of the houses, you will realize what poor quality building, poor insulation and ventilation can be in practice. The mobile phone signals are dreadful inside many housing units [of course, this is not the builder’s fault], forcing residents to use their phones out in the yard that disturbs others.

Thus, Nanchizi residents may be less able to appreciate some positive attributes of the new courtyard housing because of its substandard quality of materials and construction.

The project architect Lin Nan revealed that, to finish the project before the National Day (October 1), which is a common practice in China, the construction document was completed in just one month. The construction work was carried out at the same time as drawings were drafted, with a new set of drawings delivered to the site every week. The
whole project was finished in less than three months. If there is an issue with the construction quality, it was a direct result of the time constraint. It appeared that construction quality assurance was also missing for the project.

Moreover, the public management office was not performing well at Nanchizi. A resident revealed that it is not really property management, but run by the previously government-owned Housing Management Bureau, with untrained and unqualified staff. No formulation, regulation, or measurement is in place for maintenance fees, although maintenance work is carried out once every three years. In 2007, all the exterior walls and decorations in the courtyards were repainted using maintenance fees collected from residents. Nevertheless, maintenance work is not consistently conducted. Three of 16 interviewed residents complained that the paint on the façade has faded and peeled off, but nobody tries to retouch it. When roof tiles fell off a few years ago, the property management asked the construction team to repair them. Now the team has left, nobody restores them. The gate knocker is damaged and dead tree branches fall in the courtyards, but the property managers only collect the money without delivering work.

Planning policies and developers’ profit considerations have affected parking space provisions. The Nanchizi new courtyard housing has about 360 households, but only 150 carpark spaces available in the underground garage. The architect had hoped that residents would use the underground carpark [Figure 15] to maintain the 6 m hutong width for motor vehicles to drive through in both directions, and for meeting basic fire safety requirements. However, this parking space provision is obviously inadequate and the underground parking fee is so high that residents park their cars elsewhere. The situation worsens when residents from other lanes take over parking spots in the hutong here, prompting several residents to suggest better security of their spots using “parking lot locks” [Figure 16].

Figure 15. Opening to the underground carpark at Beijing Nanchizi new courtyard housing. Source: Photo by the author 2007

Figure 16. Widened hutong with parked cars, and Pudusi Temple in distance, Nanchizi new courtyard housing. Source: Photo by the author 2007

3.3. Social cohesion
The survey showed that on average, seven households share a new courtyard at Nanchizi. During the sales, many old neighbors still wanted to buy new housing units in the same courtyard compound to continue to be neighbors [36]. However, instead of grouping old neighbors together, the Nanchizi Committee reallocated them according to the number of bedrooms each household needed, with only 3-bedroom households reallocated in the same compound. After redevelopment, only old neighbors who know each other visit each other, but the new ones who are not acquainted seldom do so, and many do not make an effort to get acquainted.
Moreover, due to high housing prices in the inner city, many homeowners let out their units and rent a place further from the city with lower rent to make money from the difference. The survey showed that 69 percent of 71 respondents are homeowners who still live there, but 31 percent rent their units to tenants. This arrangement has a significant impact on social relations.

Nevertheless, the communal courtyard helps social interaction. In answering the question, “Which space helps your relationship with other families in the courtyard housing?” 79 percent \((n = 71)\) of the survey respondents chose “courtyard,” followed by “hutong” (21%).

During subsequent interviews, when asked, “How does the new courtyard housing help or hinder you socialize/communicate with your neighbors?”

Eight of 16 (50%) interviewed residents commented that their communal courtyards promote communication and contact, and encourage the neighbors to meet as soon as they come out of their units. The neighbors negotiate about such details as where to place belongings and how to plant flowers in the courtyard. To deepen neighborly relations, they sweep the courtyard together, eat there with one another, assist with everyday needs, such as watching out for trespassers when neighbors are away, watering flowers, offering home-cooked food, collecting laundry and mail, helping to access local services, taking a sick neighbor to hospital, and so on.

Seven of 16 interviewed residents commented positively that their social relations with neighbors are as harmonious as in the old courtyard house before redevelopment, and that there is no conflict. Two residents felt that this kind of new courtyard housing is much more conducive to social relations than apartment buildings where people can be neighbors for many years but still do not know each other, including some who share the same workplace.

Before redevelopment, a family had a private courtyard house where all their relatives lived together in one compound, but now they live in two new, adjacent courtyard compounds, their relatives visit each other irregularly, because when some come home late at night after a long day’s work, most have already gone to bed. A resident explains:

Busy with my work, I only get home at 8 pm and am limited to chatting with neighbors or gardening in the courtyard on weekends. I am not rich, the pressure from work is heavy, and I do not have much time for activities such as barbecuing in the courtyard.

Modern facility provisions such as individual bathrooms and kitchens also reduce the likelihood of neighborly communication. In the past when residents lived in traditional courtyard houses, they shared one water tap in the courtyard, and a toilet in the hutong (lane). Neighbors had more opportunities to interact and chat. Now individual homes have self-contained kitchens and bathrooms, neighborly communication and social relations deteriorate despite improved living conditions. Although the hutong is widened, it has lost traditional shops/stores and socialization hubs. Residents sometimes take a walk in the hutong or the small community garden where they meet neighbors and chat [Figure 17].

Figure 17. Community garden at Beijing Nanchizi new courtyard housing. Source: Photo by the author 2007
Noise and air pollution generated from social events in communal courtyards is an issue. A resident recounted that once, a company organized a tea party in the communal courtyard with a loud and noisy megaphone without the Residents Committee’s approval. Such social activities should always apply for approval.

Nanchizi Residents Committee managed various social activities at the Pudusi (Buddhist) Temple where they held weekly classes in weaving, English language, sports (taiji, badminton, dancing), science and technology, and spontaneous activities inspired by residents themselves. Four of 16 interviewed residents attended the activities regularly. A resident reveals her daily routine:

I participate in the community’s health activities by going to Jingshan Park in the morning, and the Community Health Club on Donghuamen Street in the afternoon, where there are aerobics, yoga, and other exercises…. In the evening, we all go to the [Pudusi] Temple, where we have activities together with neighbors whom we know and communicate easily with.

In a new courtyard compound, five of seven households are foreign families. Chinese residents indicated that most foreign residents speak good Chinese, and that they also have a good understanding of a “sense of human touch.” Foreign residents express gratitude when a Chinese neighbor helps to collect their laundry in the courtyard from the rain, or when they water their plants. Occasionally, Chinese and foreign neighbors eat and chat harmoniously under grape trellises. Even though a German doctoral student moved out due to an increase in rent, she returned to visit her Chinese neighbor several times.

Likewise, an English scholar revealed that she liked the new courtyard and found it very helpful. Despite the typical Chinese suspicion of foreigners, she got a very pleasant response as soon as she spoke in Chinese, and her neighbors were always ready to lend a hand. She was especially delighted in watching the baby next door from his mother’s pregnancy to his toddlerhood. The courtyard calmed, isolated, and connected her at the same time. When she was in London, she dreamed of being at Nanchizi where she could develop an effective routine.

A French businessman indicated that except for language barriers, there were no major problems when socializing with Chinese neighbors. The communal courtyard definitely facilitates knowledge exchange among neighbors who are usually friendly, who share many little intercultural activities, and who mutually help with picking up mail, leaving messages, and other daily routines.

Different foreign residents had different experiences at Nanchizi. In one communal courtyard, hardly any interaction took place between Chinese and foreign residents because of language barriers and cultural differences, except that foreign residents sometimes asked their Chinese neighbors about bill payment.

A German doctoral student who could speak and write proficient Chinese commented that when the communal courtyard is frequently used by neighbors’ outdoor activities, it is not an appropriate space for private reading or wine-drinking. As all outdoor (and indoor) activities are registered and even monitored by Chinese neighbors, this scrutiny is an infringement on her privacy. She stated that four years of interaction with good or bad neighbors had been enough for her, and that closer proximity may cause many problems. She also noted that Nanchizi was almost all Chinese occupied, but it has now ‘advanced’ to yet another foreign domain in Beijing that sometimes leaves her out of touch with China. Similarly, two Chinese residents complained about too many foreigners living there, affecting China’s image.
A major problem between Chinese and foreign residents is lifestyle differences. Several Chinese residents said that foreign residents often hold parties in the new communal courtyards, inviting only foreign friends. They burn candles and make a mess with leftovers in the courtyard; they are also noisy and disorderly, which irritates Chinese neighbors. However, from some foreign residents’ point of view, the communal courtyard is where social interaction should take place, and their Chinese neighbors are not very sociable because they rarely hold parties in the communal courtyards. Thus, language barriers, differences in cultural backgrounds and lifestyles may affect the use of communal courtyards.

Indoor-outdoor visual interaction through windows is a positive experience for some residents in the new courtyard, as this resident reveals:

I can continually keep my private and public space. The big window at the front gives me ample light and a connection with the courtyard, such as watching the boy next door grow up...I often speak with neighbors through the 1st-floor window. I even keep the door open and I feel safe because I know my neighbors are in the courtyard.

3.4. Cultural activities
Despite close building distances of 7–9 m and some residents raising a privacy concern, five of 16 interviewed residents commented positively that the communal courtyards offer pleasant spaces for cultural activities. Elderly residents can walk around the courtyard while caring for family members, talking and sharing a drink with neighbors, growing a vineyard, planting flowers, watering plants, raising pets, exercising (e.g., taiji), eating, reading, learning a foreign language, and so on. In one courtyard compound on a neighbor’s birthday, residents sing “Happy Birthday to You” to reveal a degree of unity created by the communal courtyard on this occasion.

The survey findings nevertheless indicated that the residents’ main focus at home is the television (65%; n = 71), followed by the computer (42%), their children (25%), and lastly, the dining table (24%). This shows how modern technologies have changed lifestyles in Beijing today.

When asked, “What traditional Chinese cultural festivals do you celebrate at home and how do you celebrate them?”

The most common survey answer was Spring Festival (Lunar New Year: the first day of the first lunar month). During the Spring Festival, some residents let off firecrackers or fireworks at midnight in their courtyards (23%), give red envelopes with money to the children (3%), and stay up all night playing majiang (4%). Since several new courtyards have wooden vine trellises that dry up in the winter, firecrackers will not be let off in it for fear of fire hazards.

Mid-Autumn Festival (Moon Festival: the fifteenth day of the eighth lunar month) was the second most celebrated festival among the survey respondents. On the night of Mid-Autumn Festival, three of 16 interviewed residents appreciate the full moon in the communal courtyards. A resident described that at around 6 pm, neighbors will sit in the courtyard chatting and savoring grapes, moon cakes, and roasted meat while enjoying the full moon together. In a private courtyard, all in-laws will come together with sometimes more than 10 people from three generations to barbeque and share foods in the courtyard. They feel more comfortable using a private courtyard than a communal one because neighbors will not complain, and there are fewer constraints for festivities.

As community/city parks/gardens are more public than courtyards, they have become the most common sites for cultural activities (49%; n = 71), followed by hutong (20%). This finding was confirmed by the interviews. When asked where they
partake in cultural activities, if not in courtyards, two of 16 interviewed residents indicated that they often walk in the Cultural Palace just east of the Forbidden City, three others reported that they usually stroll inside the Forbidden City and Jingshan Park, and another two revealed that they like to stride in the Changpuhe Park behind the crimson Imperial City Walls [Figure 18].

Figure 18. Changpuhe Park (“Calamus River Park” or “Iris River Park,” b. 2002) near Nanchizi new courtyard housing, Beijing. Source: Photo by the author 2007

4. CONCLUSION

The Nanchizi new courtyard housing was an experimental project built in a traditional courtyard house neighborhood of Beijing, in proximity to the Forbidden City and the Cultural Palace, an area of cultural and political importance. Four lessons may be learned from the redevelopment.

First, the courtyard form should maintain their original proportion of building height to distance of 1:3 as in classical Beijing siheyuan, as the smaller and irregular new courtyards have made them difficult to perform as meaningful outdoor spaces for residents. Moreover, a clearer demarcation between the semi-public and private zones in the courtyards may better facilitate their usage.

Second, the interior space of new housing units should have rational sizes and layouts. An interior space of 120–180 sqm per unit for a three- to four-person household is generally satisfactory. Moreover, since most of the residents prefer to live on the ground/1st and the 2nd floors, a 3-storey limit may be more ideal in practice.

Third, social interaction takes place more easily and often in communal courtyards than that in apartment buildings where some of the residents had previously lived. Nevertheless, common language and lifestyles also affect neighborly communication. If a communal courtyard is to be used for social gatherings/parties, approvals from the Residents Committee should be sought with regard to the time of use and responsibility for cleanups after the events.

Fourth, cultural festivities can be conducted more freely in private courtyards than that in communal courtyards because residents do not have to worry about disturbing their neighbors. Thus, creating more private courtyards may enhance cultural activities.

5. RECOMMENDATION

Since a house is a fairly permanent structure, once built, it cannot be altered easily to accommodate newer demands or higher standards. As such, housing designs should not be compromised for less than stable requirements in density, plot ratio, or floor-area ratio because while a population may fluctuate with time and place, a housing form may be less flexible. It is more environmental and economical to build for the long-term than to demolish and rebuild at a later time. Sustainability is thus viewed as more of a cultural undertaking in changing our attitudes and approaches to rehabilitating old cities and planning new ones to enhance social and human development [23, 32].

The author has proposed a design template of new courtyard-garden houses that encourages social interaction and cultural activities for ordinary citizens or middle-income families in Beijing or elsewhere [Figures 19 and 20].
Figure 19. Proposed Beijing new courtyard-garden house compound based on a system of 60 m × 60 m standard block size, a communal courtyard of 26 m × 26 m shared by eight nuclear families, with each household enjoying a private garden at the back. Each housing unit measures 6 m × 10 m (total 180 sqm) with a semi-basement and 2½ storeys. Source: Design and cardboard model by the author.

Figure 20. Proposed Beijing new courtyard-garden house compound based on a system of 60 m × 60 m standard block size, a communal courtyard of 26 m × 26 m shared by eight nuclear families, with each household enjoying a private garden at the back. Each housing unit measures 6 m × 10 m (total 180 sqm) with a semi-basement and 2½ storeys. Source: Design and computer model by the author.
The 26 m × 26 m communal courtyard size complies with the minimum 25-meter social distance for privacy concern mentioned in Gehl’s book, *Life Between Buildings* [51]. It also satisfies the optimum ratio of building height to distance 1:3 for Beijing in the author’s previous research findings [30, 50]. These measures result in the optimum number of eight households sharing a common courtyard.

ACKNOWLEDGMENTS
This is the second of the six case studies extracted from the author’s doctoral thesis: “Courtyard Housing and Cultural Sustainability: A Study of Housing Renewal and Redevelopment in Beijing and Suzhou” (2006–2012). The author would like to thank Prof./Dr Marcel Vellinga and Dr Aylin Orbasli, both at Oxford Brookes University, for their critiques, constructive comments, and suggestions at the time. The paper has analyzed and presented more case-specific data. Thanks are also due to the research participants who offered data input.

CONFLICT OF INTEREST
The author declares no conflict of interest.

FUNDING
The research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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