Promoting Green Real Estate Development by Increasing Residents’ Satisfaction

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Abstract: Green real estate is a new form of development that seeks to reduce the negative impact of real estate construction on the environment and society. It offers various forms of environmental and social utility and also bears higher construction costs. Residents’ satisfaction and willingness to pay (WTP) are therefore of great significance for the progress of green real estate. However, residents’ satisfaction with green residential areas and its correlation with WTP has been insufficiently researched. This study draws on face-to-face interviews conducted with 614 households in Qingtangwan (an exemplary green real estate project in Beijing) to extract information about residents’ satisfaction and WTP. With regard to satisfaction, it identifies five main components, specifically the operation and maintenance of residential areas, indoor and outdoor comfort, building quality, sustainable community attachment, and public facility accessibility (this last category had lower satisfaction). In terms of WTP, residents’ mean WTP was found to be CHY 204.23 per month, which is approximately USD 31.19. In addition to the bid value, the indoor and outdoor comfort, building quality, sense of community, and public facility accessibility were all found to be significantly related to residents’ WTP. Relevant policy recommendations for promoting this development mode included the establishment of public funds, the regular collection and disclosure of information about residents’ satisfaction, phased rent increases, and the enhancement of community cultural construction.

Keywords: green real estate; household; real estate; residents

1. Introduction

The real estate and construction industries influence the socially sustainable development of the economy and environment [1,2]. In China, the real estate and construction industry positively contribute to national economic growth, but also consume a large amount of social resources [3]. The massive release of greenhouse gases during building construction also worsens global warming.

Green buildings are an important way of achieving sustainability in urban construction, and this is one of the reasons they are becoming increasingly popular across the world. They seek to minimize the impact on the environment during the whole building life cycle, improve residents’ living experience, and increase the returns of investors and local communities. They have become an inevitable choice for sustainable urban development. After initially being proposed in 1960, they have become increasingly popular across the world, especially in comparatively developed areas [4].

China is currently popularizing the construction of green real estate [5], which is a commercial development model that absorbs green building ideas and real estate development. It is established on the basis of green building standards, and seeks to obtain profit. Green buildings mainly focus on technical issues in architectural design and construction, with the intention of realizing the environmental value of individual buildings. While green real estate development construction covers a wider range of content, including...
sustainable residential area site design, program planning, material selection and technical design, construction, operation and maintenance, and demolition. It comprehensively takes the environmental value and social value of group buildings into account at the regional level, and not only does it consider its impact on the environment from a low carbon and environmental protection perspective, but it also considers residents’ demand for a high-quality living environment from a user experience perspective [5]. The construction of green real estate needs to achieve the existing goals of environmental protection, energy conservation, and emission reduction; it needs to offer environmental utility and keep a high quality of living experience. It also needs to offer social utility, which involves the use of green building materials, the upgrading of public service facilities, and the optimization of management and operation models, all of which will entail increased costs [6].

These additional expenditures have henceforth been the main obstacles to the large-scale promotion of green real estate construction. Government subsidies and policy and regulatory incentives have henceforth been the main driving force behind the facilitation of green real estate construction, and this means most of the positive externalities of green real estate have been rewarded by the government. Recent studies indicate that there is scope for green real estate consumers to pay for some of the incremental positive externalities, especially when these extra costs result in better living conditions [7]; this implies that the user demand-side acceptance should be fully considered with the aim of reducing the financial burden on the government and promoting the sustainable development of green real estate in the long run.

Previous studies of residents’ acceptance of green buildings mainly focused on residents’ WTP and satisfaction [7,8]. With regard to WTP, existing studies mostly focus on the payment status of potential buyers for individual green buildings and the driving factors behind them. For example, Portnov, Trop [9], and Trop [10] quantitatively analyzed residents’ WTP for green residence and its influencing factors. Chau, Tse [11] and Zalejska-Jonsson and Agnieszka [12] compare differences in residents’ WTP for green residences and ordinary residences.

In referring to the driving factors behind WTP, most studies show that when compared with moral responsibility and altruistic beliefs, personal interests are the major influencing factor. At present, research into WTP for green buildings mostly focuses on individual residence and gives less consideration to the residential areas ubiquitous in China and other countries. Satisfaction with green buildings has also been analyzed by referring to indoor and outdoor comfort [13,14], operation and maintenance [15], building design [16], and public resource accessibility [15,17]. The objects of related research were mostly buildings certified by the Leadership in Energy and Environmental Design (LEED), the Building Research Establishment Environment Assessment Method (BREEM), or other certification systems. These certification systems primarily consider the low-carbon and environmental-friendly performance of buildings (mostly office buildings) from an environmental perspective. However, few studies consider satisfaction with residential buildings from environmental and social perspectives.

In this study, we focus on the satisfaction and WTP of current occupants of the Qingtingwan residential community, which is an exemplary green real estate project in Beijing. This study differs from previous studies in two respects. First, the objects of the previous research were mostly individual buildings dominated by office buildings. In contrast, this study focuses on green residential areas that integrate the idea of green development. Second, previous research mostly focused on a certain aspect of residents’ satisfaction with the value of green buildings. In contrast, this study comprehensively assessed satisfaction from both environmental and social perspectives, and explored how different dimensions of satisfaction affect residents’ WTP, and it does so with the intention of identifying their priority in affecting residents’ acceptance. Residents’ satisfaction with green real estate and its impact on WTP will provide important references for cost-benefit analysis addressed to the promotion of green real estate construction. The government plans to promote this development mode in the future, and this information will provide
an important basis for related incentive policy development. The research flowchart was listed below (Figure 1).

![Research flowchart](image)

This paper consists of five sections: Section 2 introduces the methods; Section 3 presents the results; Section 4 discusses these results; and Section 5 concludes and considers future research prospects.

2. Methods

2.1. Data Collection and Sorting

The research data were obtained by field interviews based on questionnaires that were conducted as part of the Qingtangwan green real estate program, which works across an area of 21,000 square meters and engages about 3790 households. It was the first green real estate project in Beijing that was constructed in accordance with the Standard of Green Residential Areas, which was issued in 2019. The Standard sets requirements for residential areas that relate to site design, resource conservation, regional quality, residential area planning, traffic organization, indoor environment and design, and construction. For example, in contrast to the conventional gated communities in China’s large cities, it shows a full concern with connections to the urban traffic system, fabricated structure technique, an intelligent management system, and resource conservation ideas, which are each fully integrated into this project’s design and operation process (Figure 2).

With the assistance of Housenwell, a professional survey institution, this study conducted face-to-face interview surveys in Qingtangwan with the aim of understanding residents’ satisfaction with the green real estate project and WTP. The survey was distributed between 2 February and 20 February 2021. Each respondent was informed in advance about the purpose and background of the interview, and was rewarded after completing the questionnaire. A total of 614 valid questionnaires were collected by the survey.
The survey questionnaire had four parts. First, the background information was displayed, including the purpose of the survey. The design philosophy of low-carbon environmental protection in the planning layout, building design, and construction, operation, and maintenance of Qingtangwan were also set out. Second, residents’ demographic information was collected. Third, residents’ satisfaction with each index was extracted. The satisfaction index system was constructed on the basis of relevant regulations and literature research, and each index consisted of five grades (1—very dissatisfied; 2—relatively dissatisfied; 3—neutral; 4—relatively satisfied; 5—very satisfied). Fourth, residents’ WTP for green real estate construction was extracted by asking: ‘Are you willing to pay X additionally for this green residential area every month?’ The payment vehicle was the property management fee.

2.2. WTP Elicitation Method

The double-bounded dichotomous choice questionnaire format was used to elicit WTP. This method can mimic the real situation of residents’ purchase, and it has been recommended by the National Oceanic and Atmospheric Administration (NOAA) [18,19] on this basis. Each respondent was asked whether they would be willing to pay a specific amount. If not, the respondent would be asked again if they were willing to pay a smaller amount. If the respondent was willing to pay, they would be asked again if they were willing to pay a larger amount. Possible responses included “yes-no”, “yes-yes,” “no-no”, and “no-yes”. The binary-valued indicator variables were $I_{YN}^i$, $I_{YY}^i$, $I_{NN}^i$, and $I_{NY}^i$, respectively.

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$G_C(A; \gamma)$ is a cumulative distribution function (cdf) that refers to WTP; $\gamma$ is the parameter to be estimated; and $A$ is the value of the bid. $A_1$ refers to the initial bid, while $A_1^h$ ($A_1 < A_1^h$) is the higher bid presented after the initial bid, and $A_1^l$ is the lower bid presented after the initial bid. The log-likelihood function is calculated as follows:

$$
\ln L = \sum_{i=1}^{N} \{I_{YY}^i \ln [1 - G_C(A_1^h; \gamma)] + I_{YN}^i \ln [G_C(A_1^h; \gamma) - G_C(A_1^l; \gamma)]
+ I_{YY}^i \ln [G_C(A_1^l; \gamma) - G_C(A_1^h; \gamma)] + I_{NN}^i \ln G_C(A_1^l; \gamma) \}
$$

Formulating $1 - G_C(\cdot)$ as logistic cdf, and combining this with $\gamma = (a, b)$ yields:

$$
G_C(A_1; \gamma) = \frac{1 + \exp(a - bA)}{1 + \exp(a - bA)}
$$

$C^+$ is the mean WTP, where $C$ can be both positive and negative. The mean WTP is $C^+ = a/b$. 

![Figure 2. A plan of the Qingtangwan Residential Community (Source: China Institute of Building standard design and research http://www.cbs.com.cn/ (accessed on 1 August 2021)).](image)
In this paper, four groups of bid value were set up, specifically (25/50/100), (100/200/400), (500/1000/2000), and (1000/2000/4000). The middle number was the initial bid value, the first number was the lower bid value, and the last number was the higher bid value. These combinations were randomly assigned to each respondent in the interview, and the range of bid values was determined in the pre-survey by the open-ended questionnaire format; 5 percent observations from both tails of the distributions were trimmed, and bid combinations were selected from the remaining distribution.

3. Results
3.1. Residents Demographic Information

Of the 614 respondents, males and females accounted for 51.5 percent and 48.5 percent, respectively. Residents aged 31–49 years old were the largest proportion of respondents (45.6 percent), followed by those aged 18–30 years old (35.2 percent). More than 70 percent of residents had a monthly income of CHY 5000–20,000. About half of the households had 1–2 family members (49.3 percent), and 44.1 percent had 3–4 family members. Moreover, 32.9 percent of residents lived on the 4th–6th floors, followed by those living on the 7th–9th floors (27.2 percent), 1st–3rd floors (22.5 percent), and the 10th floor or higher (17.4 percent). The commuting distance was 5–10 km for most residents (36.8 percent), followed by 2–5 km (22.3 percent), and less than 2 km (21.3 percent); Almost a fifth (19.5 percent) of residents had a commuting distance of more than 10 km (Table 1).

Table 1. Respondents’ demographics.

| Variables (Characteristic) | Frequency | Percentage |
|----------------------------|-----------|------------|
| Gender                     |           |            |
| Male                       | 316       | 51.5       |
| Female                     | 298       | 48.5       |
| Age                        |           |            |
| 18–30                      | 216       | 35.2       |
| 31–49                      | 280       | 45.6       |
| 50–64                      | 91        | 14.8       |
| Over 65                    | 27        | 4.4        |
| Income                     |           |            |
| 0                          | 29        | 4.7        |
| 1–5000                     | 98        | 16         |
| 5001–10,000                | 214       | 34.9       |
| 10,001–20,000              | 218       | 35.5       |
| Over 20,000                | 55        | 9          |
| Number of family members   |           |            |
| 1–2                        | 303       | 49.3       |
| 3                          | 147       | 23.9       |
| 4                          | 124       | 20.2       |
| Other                      | 40        | 6.5        |
| Floor                      |           |            |
| 1–3                        | 138       | 22.5       |
| 4–6                        | 202       | 32.9       |
| 7–9                        | 167       | 27.2       |
| 10 or above                | 107       | 17.4       |
| Number of rooms            |           |            |
| 1 bedroom and 0 livingroom | 113       | 18.4       |
| 1 bedroom and 1 livingroom | 246       | 40.1       |
| 2 bedroom and 1 livingroom | 251       | 40.9       |
| Other                      | 4         | 0.7        |
| Commuting distance         |           |            |
| Less than 2 km             | 131       | 21.3       |
| 2–5 km                     | 137       | 22.3       |
| 5–10 km                    | 226       | 36.8       |
| over 10 km                 | 120       | 19.5       |

3.2. Residents’ Satisfaction and its Dimension

In this paper, residents were grouped on the basis of their satisfaction (1–2 points: less satisfied; 3 points: moderately satisfied; and 4–5 points: satisfied), with the aim of intuitively presenting their attitudes towards different indices. Generally speaking, residents were relatively positively satisfied with green residential areas. Of these, residents were most satisfied with the property management (88.8 percent), followed by public safety and water supply systems (88.1 percent), which indicated residents were satisfied with residential area operations and services or the accessibility of public service facilities. The satisfaction rate of bus stop accessibility was 37.9 percent, but the dissatisfaction rate
reached 22.5 percent. The satisfaction rate of the medical health facility accessibility was 34 percent, but the dissatisfaction rate reached 29.2 percent (Figure 3).

The mean satisfaction of each index is shown in Table 2. The satisfaction fluctuated between 3.12 and 4.32, which indicated that residents regarded green residential areas more positively. They were most satisfied with the barrier-free design, the residential area’s safety, and the property management, and they were the least satisfied with public transportation facility accessibility, life service facility accessibility, and the indoor sound insulation.

This study has approximately 30 satisfaction indices. However, inherent correlations may be found among them, and so it is necessary to reduce their dimensions. The results of the Kaiser–Meyer–Olkin’s and Bartlett’s tests of sphericity were 0.96 and 0.00, respectively, indicating the need for data reduction. This paper uses Principal Component Analysis (PCA) for data analysis and applies orthogonal transformation to convert a group of potentially correlated variables into a group of linear, uncorrelated variables. This paper
uses Varimax rotation to analyze the paper’s indices, and it finally extracts five components that are used to explain 71.06 percent of the variance (Table 3).

Table 2. Residents’ overall satisfaction level.

| Index                                                                 | Mean Value |
|----------------------------------------------------------------------|------------|
| Property management                                                  | 4.31       |
| Maintenance of public facilities                                     | 4.26       |
| Environmental sanitation                                             | 4.27       |
| Greening maintenance                                                 | 4.19       |
| Public space energy conservation                                     | 4.14       |
| Traffic organization                                                 | 4.05       |
| Drainage management                                                  | 4.25       |
| Safety management                                                    | 4.32       |
| Barrier-free designs                                                 | 4.32       |
| Intelligent design                                                   | 4.20       |
| Indoor natural lighting                                              | 3.97       |
| Indoor air quality                                                   | 4.19       |
| Indoor thermal comfort (winter)                                      | 4.09       |
| Indoor thermal comfort (summer)                                      | 4.12       |
| Outdoor air ventilation                                              | 4.15       |
| Indoor air ventilation                                               | 4.21       |
| Indoor soundproofing                                                 | 3.24       |
| Thermal and insulation performance                                   | 3.96       |
| Window air tightness                                                 | 3.86       |
| Electricity and water supply                                         | 4.20       |
| Outdoor noise control                                                | 3.96       |
| Public transportation accessibility                                   | 3.22       |
| Commercial, entertainment, and public health facility accessibility   | 3.12       |
| Publicity of low carbon                                              | 4.04       |
| Publicity of sustainable lifestyle                                   | 4.14       |
| Publicity of energy conservation                                    | 4.04       |
| Sense of community                                                   | 4.11       |
| Public participation                                                 | 4.00       |

Component 1 included a total of 10 variables that were all correlated with the residential area’s operation and maintenance. It was therefore named residential area operation, and was seen to explain 48.4 percent of the variance. Component 2 included a total of six variables that were all correlated with living comfort, and so it was named indoor and outdoor comfort and was seen to explain 9.30 percent of the variance. Component 3 contained a total of five variables that were all correlated with community attachment and low-carbon lifestyles, and so it was named ‘sense of sustainable community’ and was seen to explain 5.64 percent of the variance. Component 4 contained four variables that were all correlated with building quality, and so it was named ‘building quality’ and was seen to explain 4.11 percent of the variance. Component 5 covered the accessibility of public transportation system and commercial, medical, and recreational facilities, which were all correlated with public service facility accessibility, and so it was named ‘public facility accessibility’ and was seen to explain 3.59 percent of the variance. The classification of the satisfaction dimensions is shown in Figure 3. The residents’ score for each component was also calculated by this study. It should be noted that the indicators of electricity and water supply were excluded from this process because of limited information (Figure 4).
Table 3. Rotated component matrix.

| Indicator                                 | Component 1 | Component 2 | Component 3 | Component 4 | Component 5 |
|------------------------------------------|-------------|-------------|-------------|-------------|-------------|
| Property management                      | 0.80        |             |             |             |             |
| Maintenance of public facilities         | 0.75        |             |             |             |             |
| Environmental sanitation                 | 0.76        |             |             |             |             |
| Greening maintenance                     | 0.79        |             |             |             |             |
| Public space energy conservation         | 0.78        |             |             |             |             |
| Traffic organization                     | 0.72        |             |             |             |             |
| Drainage management                      | 0.67        |             |             |             |             |
| Safety management                        | 0.76        |             |             |             |             |
| Barrier-free designs                     | 0.78        |             |             |             |             |
| Intelligent design                       | 0.72        |             |             |             |             |
| Indoor natural lighting                  |             | 0.70        |             |             |             |
| Indoor air ventilation                   |             | 0.74        |             |             |             |
| Indoor air quality                       |             | 0.73        |             |             |             |
| Indoor thermal comfort (winter)          |             | 0.62        |             |             |             |
| Outdoor air ventilation                  |             | 0.69        |             |             |             |
| Indoor thermal comfort (summer)          |             |             | 0.71        |             |             |
| Indoor soundproofing                     |             |             |             |             | 0.59        |
| Thermal and insulation performance       |             |             |             |             | 0.72        |
| Indoor air tightness                     |             |             |             |             | 0.71        |
| Outdoor noise control                    |             |             |             |             | 0.73        |
| Public transportation accessibility      |             |             |             |             | 0.87        |
| Commercial, entertainment, and public   |             |             |             |             | 0.83        |
| health facility accessibility            |             |             |             |             |             |
| Publicity of low carbon                 |             |             |             |             | 0.70        |
| Publicity of sustainable lifestyle       |             |             |             |             | 0.70        |
| Publicity of energy conservation        |             |             |             |             | 0.70        |
| Sense of community                       |             |             |             |             | 0.74        |
| Public participation                     |             |             |             |             | 0.79        |

Figure 4. Dimension of residents’ satisfaction.
3.3. Residents' WTP and Determinants

In this study, four bid combinations were set up and were randomly assigned to each resident in the interview. The results showed that as the increase in the bid value increased, the proportion of no-no responses also significantly rose. This suggested that the payment amount had a large effect on residents’ WTP (Table 4).

Table 4. Distribution of responses.

| Bids Combination | YY (17.8%) | YN (35.4%) | NY (8.6%) | NN (38.2%) | SUM (100%) |
|------------------|------------|------------|-----------|------------|-------------|
| 25/50/100        | 27 (17.8%) | 54 (35.4%) | 13 (8.6%) | 58 (38.2%) | 152 (100%)  |
| 100/200/400      | 6 (3.9%)   | 20 (13.1%) | 18 (11.8%)| 109 (71.2%)| 153 (100%)  |
| 500/1000/2000    | 6 (4.0%)   | 7 (4.6%)   | 10 (6.6%) | 128 (84.8%)| 151 (100%)  |
| 1000/2000/4000   | 1 (0.6%)   | 5 (3.2%)   | 4 (2.5%)  | 148 (93.7%)| 158 (100%)  |
| SUM              | 40 (6.5%)  | 86 (14.0%) | 45 (7.3%) | 443 (72.2%)| 614 (100%)  |

The estimation result without covariance is presented in Table 5. The maximum likelihood estimation function was applied to estimate the parameter. The mean WTP is CHY 204.23, which is approximately USD 31.19. The result is statistically significant at the one percent level. We also obtained the 95 percent and 99 percent confidence intervals for the estimate, and achieved this by using Krisky’s and Robb’s parametric bootstrapping method approach with 5000 replications [20].

Table 5. WTP estimation result.

| Variables        | Coef      | t-Values | p-Values |
|------------------|-----------|----------|----------|
| constant         | 1.308828255 | 25.932259 | 0        |
| Bid              | 0.007579632 | 103.4773252 | 0        |
| Mean WTP         | 204.2252997 | 37.0920321 | 0        |
| 95% confidence interval | 193.6683041 | 215.2127407 | 0        |
| 99% confidence interval | 189.4307546 | 218.1699745 | 0        |
| Wald statistic   | 11133.39389 | 0        |
| Log-likelihood   | −1013.195243 | 0        |

Notes: The unit of mean WTP is Chinese Yuan.

With regard to the determinants of residents’ WTP, the binary logistic regression model was adopted to analyze the correlation of the residents’ acceptance of a given bid with demographic characteristics and satisfaction. The results revealed the bid value was significantly related to the residents’ WTP (Table 6), as expected. Demographic characteristics did not reveal factors significantly related to the bid value. With regard to satisfaction factors, operation and maintenance, indoor and outdoor comfort, public facility accessibility, building quality and low-carbon community attachment were all found to be significantly correlated with the residents’ acceptance of a given bid. Of these, building quality was found to be significant at the 10 percent level, and living comfort, low-carbon community attachment and public facility accessibility were found to be significant at the 5 percent level.
Table 6. Estimation result of the logistic regression model.

| Variables                  | Coef  | Standard Error | Wald Statistic | Degree of Freedom | p Value |
|----------------------------|-------|----------------|----------------|-------------------|---------|
| Bid                        | 1.230 | 0.135          | 83.436         | 1                 | 0.000   |
| Gender                     | 0.091 | 0.243          | 0.140          | 1                 | 0.708   |
| Age                        | −0.230| 0.157          | 2.147          | 1                 | 0.143   |
| Income                     | −0.190| 0.124          | 2.358          | 1                 | 0.125   |
| Z score for component 1    | −0.066| 0.124          | 0.287          | 1                 | 0.592   |
| Z score for component 2    | 0.368 | 0.134          | 7.556          | 1                 | 0.006 **|
| Z score for component 3    | 0.244 | 0.125          | 3.826          | 1                 | 0.050 **|
| Z score for component 4    | 0.239 | 0.124          | 3.725          | 1                 | 0.054 * |
| Z score for component 5    | 0.355 | 0.118          | 9.076          | 1                 | 0.003 **|
| Constant                   | −0.180| 0.721          | 0.062          | 1                 | 0.803   |

Notes: * p < 0.1, ** p < 0.05. Component 1: Operation; Component 2: Indoor and outdoor comfort; Component 3: Sense of sustainable community; Component 4: Building quality; Component 5: Public facility accessibility.

4. Discussion

The monthly mean WTP of residents in Qingtangwan was CHY 204.23 per household, or about 10 percent of the rent in the residential area. Previous studies of the WTP for green buildings revealed residents were willing to pay an additional 5–10 percent for green buildings [9,12]. The monthly mean WTP of this study was slightly higher than that recorded by the previous study. This is possibly because most previous studies targeted the potential buyers of green buildings, while this study instead focused on existing residents in green residential areas. A large number of studies have demonstrated that residents’ sustainable behaviors can be cultivated in the green buildings themselves and suggest that this affected residents’ acceptance of green buildings [1,21,22]. Taking into account the approximately 3790 households in this residential area, the total annual WTP is CHY 9.28 million (USD 1.45 million), which can be used to meet the majority of daily maintenance and operation costs in the community. In future operations, public funds can be used to promote low-carbon and environmental friendly lifestyles; alternatively, rents can be increased every year, as this will help to reduce the dependence of green residential area construction on government subsidies and incentives.

In this study, satisfaction with indoor and outdoor comfort, public facility accessibility and sustainable community attachment were all found to be significantly related to residents’ WTP and the operation and maintenance of Qingtangwan residential community. This illustrated the need to comprehensively consider environmental protection factors and user demand factors when promoting the construction of similar green real estate projects. The China Green Building Label (GBL) previously consisted of two systems, namely, GBLD and GBLO. The former mainly focused on issues related to design, including embodying the green environmental protection concept in planning, design, and construction, and the latter focused on enshrining the same concept in the operation and maintenance of green buildings [23]. These evaluation systems mainly evaluate the building of environmental sustainability, namely the performance of energy conservation, resource utilization optimization, and carbon emissions reduction.

Qingtangwan is the first social residential project constructed in accordance with the Construction Standard of Green Residential Areas, which presents the concept of green real estate construction to a certain extent and also sets requirements for many aspects, including community environment, construction, material selection, operation and maintenance, and planning and design. The specific survey found that resident satisfaction with the accessibility of the public service facilities remained low and also significantly affected residents’ WTP for residential areas. This is possibly because this index has not been sufficiently acknowledged in the standard formulation, and this highlights an aspect that could be further improved in the future. In the future, a systematic post-occupation evaluation mechanism should be established, and more authoritative third-party evaluation agencies should be introduced to regularly collect information about residents’ satisfaction. Some
studies suggest public opinions can significantly improve residents’ investment in environmental protection [24]. It may therefore be feasible to publish feedback from residents and exchange information about suggested improvements in public communication platforms that could improve residents’ satisfaction with green real estate projects in the future.

It is worthwhile to note that satisfaction with a sense of sustainable community has significantly impacted the green real estate project’s WTP. In this study, ‘sustainable community’ referred to the sense that community residents had been a member of a sustainable community and closely interacting with other residents. This consciousness can help to promote a sense of responsibility to the community and encourage residents to participate in public governance, which can in turn promote the efficient implementation of sustainable policies [25,26]. With regard to the enhancement of residents’ sense of community, a large number of studies have pointed to ways in which community attachment can be enhanced, including the improved walking accessibility of public service facilities in the community and improvements in the quality of open public spaces and collective community activities [27,28]. However, residents’ community attachment in China is generally low, and this is attributable both to the poor quality of communities and the top-down approach of the social management system [29]. In the future, equal emphasis should be placed on establishing hardware facilities and operating systems, as this will improve residents’ satisfaction.

5. Conclusions

This study distributes a questionnaire survey to 614 residents of Qingtangwan, an exemplary green real estate project in Beijing, with the aim of extracting their satisfaction with green residential areas and analyzing the effects of different satisfaction components on the WTP. Five satisfaction factors were identified, specifically the operation and maintenance of the residential area, indoor and outdoor comfort, building quality, sustainable community attachment, and public facility accessibility. The results indicated residents were generally satisfied with green residential areas and showed low levels of satisfaction with public facility accessibility. The WTP was elicited by using the double-bounded dichotomous choice questionnaire, which revealed that Qingtangwan residents were willing to pay an additional CHY 204.23 (about 10% of the average rent of the residential area) every month to the green real estate project. Analysis of the correlation between satisfaction and WTP found that bid value, building quality, indoor and outdoor comfort, sustainable community attachment, and public facility accessibility were significantly correlated with WTP; operation and maintenance, in contrast, were not found to produce significant effects.

These studies suggest that environment-oriented evaluation elements should be combined with user-oriented evaluation elements to establish a comprehensive evaluation system in promoting the development mode of Qingtangwan in the future, as this will improve residents’ satisfaction with the built environment. Meanwhile, an institutionalized post-occupation evaluation system and problem feedback system should be established, and the evaluation system should be revised. Residents’ acceptance of green residential areas can be increased by enhancing their community consciousness. Moreover, public funds can be established to support the operation and maintenance of residential areas and promote green and ecological lifestyles. Alternatively, a stepped charging strategy can be used to alleviate the dependence of green residential areas on government subsidies. In the meantime, an institutionalized approach should be used to collect and exchange user’s satisfaction information with the aim of increasing their satisfaction. This will enhance their acceptance of green real estate projects with similar development modes in the future and facilitate the transformation of green real estate in a market-oriented direction.

The main limitation of this study is that it is only focuses on an exemplary green real estate project in Beijing. Although interviewees came from all walks of life, they all lived in Beijing, and this limited the study’s representativeness. Accordingly, more comparative studies that engage the users of green residential communities in different social patterns
should be conducted in the future. In addition, residents’ WTP usually deviates from their actual actions, and this also needs to be further verified. The WTP of residents in green residential areas and potential buyers can be compared to reveal how the living experience affects purchasing behavior and preference for a green real estate project. With regard to the influencing mode of community attachment on the acceptance of green real estate project, approaches such as the structural equation model should be applied, as this will provide in-depth insight into its internal action mechanism.

Author Contributions: Funding acquisition, Y.F. and X.Y.; validation, J.Z.; writing—original draft, L.Z. All authors have read and agreed to the published version of the manuscript.

Funding: This research is sponsored by the National Natural Science Foundation of China (Grant No.51638003) and the Chinese Postdoctoral Science Foundation (2020M682886).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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