

CUE2018-Applied Energy Symposium and Forum 2018: Low carbon cities and urban energy systems, 5–7 June 2018, Shanghai, China

## Antecedents of Residents' Repurchase Intention of Green Residential Building: Case Study of Sino-Singapore Tianjin Eco-city

Yunxia Liu<sup>a\*</sup>, Zaisheng Hong<sup>b</sup>, Xunpeng Shi<sup>c</sup>

<sup>a</sup>College of Management and Economics, Tianjin University, 92 Weijin Road, Nankai District, Tianjin 300072, China

<sup>b</sup>Research Institute of Architectural Design & Urban Planning, Tianjin University, No.192 West Anshan Road, Nankai District, Tianjin, China

<sup>c</sup>Australia-China Relations Institute, University of Technology Sydney, NSW 2007, Australia

---

### Abstract

Green Residential buildings (GRB) emerge but haven't been widely accepted among residents in China. Therefore, motivating repurchase behaviours is of strategic importance. However, previous literature is inadequate to explain residents' repurchase intention of GRB. In the present study, a survey is conducted among residents in Sino-Singapore Tianjin Eco-city, where all housings have been certified as green buildings. Structural equation model (SEM) is used to explore the antecedents of residents' repurchase intention. Results show: 1) Eco-city residents' trust in GB certification parties is found to have ineligible impact on repurchase intention. 2) The mean of overall satisfaction score (3.38) indicates a low satisfaction level in general sense. Residents mainly complain about bad service of property management companies, inconvenience of living, and poor construction and facility quality. Findings imply that as existing customers of GRB hence key stakeholders for GRB promoting, Eco-city residents' roles are not valued, and green operation deserve more attention. Suggestions are given to launch information and publicity programs and taking initiatives to fill the gap between green design and weak operation.

Copyright © 2018 Elsevier Ltd. All rights reserved.

Selection and peer-review under responsibility of the scientific committee of the CUE2018-Applied Energy Symposium and Forum 2018: Low carbon cities and urban energy systems.

**Keywords:** Repurchase intention; Occupancy satisfaction; Green residential building; Sino-Singapore Tianjin Eco-city

---

---

\* Corresponding author. Tel.: +86 022-27402304

E-mail address: [stefanie@tju.edu.cn](mailto:stefanie@tju.edu.cn)

## 1. Introduction

More than 10 years after China's launch of its green building (GB) labeling program, the number of GB label projects increases from 0 before 2008 to about 4000 by the end of 2015 [1]. However, they account for only a small part of the total building stock in China [2]. Therefore, more practical efforts and studies are needed to promote GB in China. Urban residential buildings account for large share among all building types and involve many stakeholders. In this paper, we target on promoting green residential buildings (GRB) among urban residents.

While many progresses have been made for GRB investment and development [3], there are some observable shortcomings. The current progresses mainly focus on the supply of GRB, with policies targeting on the stakeholders of designers, developers, researchers, contractors and so on. However, both previous practices and studies lack deep insight into demand of GRB, especially consumers' purchase or repurchase intention.

In terms of explaining purchase intention of residents who have no purchase or living experience in GRB, several predictors are found, such as subjective knowledge and perceived usefulness of GRB, social trust in responsible parties, and environmental attitude. But to our best knowledge, no researches have been done to study repurchase intention of residents who already buy and live in GRB.

The present study takes a case study of residents in Sino-Singapore Tianjin Eco-city (hereafter referred to as Eco-city), where all buildings have been certified as GBs. However, as a demonstration of GBs, its effect on GRB promotion among residents hasn't been well-studied. In addition, we are also interested in: To what extent the GRBs satisfy residents living in the Eco-city. Understanding residents' assessment of GRBs can inform future design of GRBs and improve their performance in operation phase.

A survey on repurchase intention and occupancy satisfaction is conducted, aiming to address the following research questions: 1) Which factors may explain Eco-city residents' repurchase intention of GRBs? 2) How about the performance of the residential buildings designed and certificated to be GBs in Eco-city? Especially when we focus on the operation phase? 3) Does residents' occupancy satisfaction play an role to predict Eco-city residents' repurchase intention?

## 2. Methodology

A questionnaire is developed to collect residents' background, occupancy satisfaction and repurchase intention data. Residents' satisfaction is revealed by several items covering the indoor environmental quality, outdoor environment and comfort, quality of buildings and facilities, energy saving and environmental protection, operation and maintenance, facilities and convenience. An open question is used to collected residents' comments or complains on their GRBs in Eco-city. Other four determinants of residents' repurchase intention are also investigated, including Eco-city residents' subjective knowledge about GRB, social trust in responsible institutions for green building certification and management, environmental attitude, perceived usefulness from GRB, and their repurchase intention.

In the repurchase intention model, seven hypotheses were developed based on previous studies[4-12]. They are:

H1 : Subjective knowledge of GRB has positive impact on perceived usefulness from it.

H2 : Social trust in responsible parties has positive impact on perceived usefulness from GRB.

H3 : Environmental attitude has positive impact on perceived usefulness from GRB.

H4 : Subjective knowledge of GRB has positive impact on repurchase intention.

H5 : Social trust in responsible parties has positive impact on repurchase intention.

H6 : Environmental attitude has positive impact on repurchase intention.

H7 : Perceived usefulness has positive impact on repurchase intention.

H8: Occupancy satisfaction has positive impact on perceived usefulness.

H9: Occupancy satisfaction has positive impact on repurchase intention.

Structural equation modelling (SEM) is used to analyse the proposed model and explore the role of antecedents in explaining repurchase intention.

### 3. Results

#### 3.1 Residents' occupancy satisfaction and complaints

Residents' complaints on their GRBs are summarized in Table 1. They reflect problems of GRBs in the operation phrase. The causes of their complaints mainly include bad service of property management companies, inconvenience of living, poor construction and facility quality.

Table 1. Residents' complaints

Category	Complaint
Service of property management company	The service of property management company needs to be improved.
	I am not satisfied with the cleanness work of the property management company.
	Workers are not friendly.
	Property management company workers are slack at maintenance work.
Quality	They do nothing to regulate car parking even fire exits are blocked.
	Room soundproofing is terrible.
	Developers' decoration is bad.
	The solar water heaters are broken but no parties claim to be responsible for repair.
	The elevators often broke up.
	The construction quality doesn't deserve owners' expectancy.
	Poor construction results in leaks and cracks of the building.
Inconvenience of life	Traffic jams are terrible during rush hours.
	Bad public transport accessibility to other urban areas in Tianjin.
	Roads are too narrow for increasing heavy traffic.
	The traffic layout in Eco-city needs to be redesigned.
	Irregular projects are often constructed but no actions are taken against them.
	More public recreational and sports facilities are needed.

Figure 1 Shows the distribution of Eco-city residents' satisfaction. The mean satisfaction level for the 345 Eco-city residents is 3.38 and the standard deviation is 0.79. It's greater than 3 but less than 4 in a five-point scale, indicating a low occupancy satisfaction level. The curve has a skewness of -0.17 and kurtosis of -0.25, both are greater than -1, the critical ratios for skewness and kurtosis estimates are less than 1.96, indicating that Eco-city residents' satisfaction follows a normal distribution.

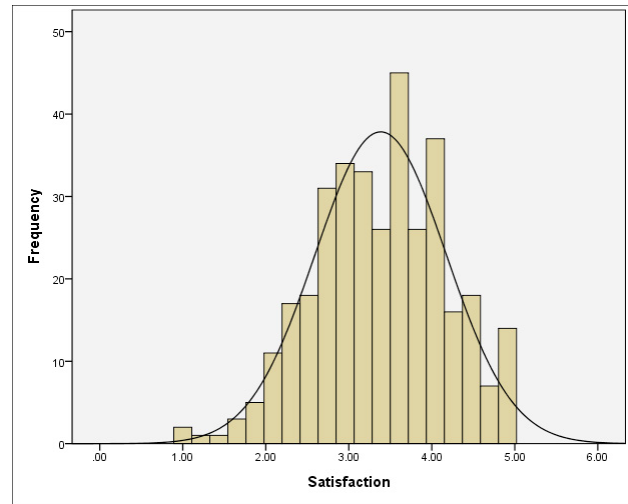


Fig. 2. Distribution of satisfaction level

### 3.2 Model estimation

The proposed model is estimated using 345 sample data and the model fit is acceptable (Table 2). The squared multiple correlation of 0.55 for repurchase intention indicates a moderate level explanatory power.

Table 2. Model fit

Index	CMIN/DF	GFI	NFI	IFI	CFI	PNFI	PCFI	RMSEA
Value	2.94	0.89	0.91	0.94	0.94	0.75	0.77	0.075
Threshold	<3	>0.9	>0.9	>0.9	>0.9	>0.5	>0.5	<0.08

Note: CMIN/DF: Chi-square/degrees of freedom. GFI: Goodness-of-fit index. NFI: Normed Fit Index. IFI: Incremental Fit Index (IFI). CFI: Comparative Fit Index. PNFI: Parsimony adjustment to the NFI. PCFI: Parsimony adjustment to the CFI. RMSEA: Root mean square error of approximation.

Results show that four hypotheses (H2, H4, H8 and H9) are rejected. Subjective knowledge (H2,  $p=0.376$ ) and social trust (H4,  $p=0.205$ ) are found to have no direct impacts on repurchase intention. Residents' satisfaction has no direct (H9,  $p=0.605$ ) and indirect impact (H8,  $p=0.994$ ) on repurchase intention (Table 3).

Table 3 Test of hypotheses

Hypotheses	Path	Estimate of regression weights (unstandardized)	Standard Error	Critical Ratio	p
H1	PU<--SK	0.413	0.052	7.927	***
H2	RI <--SK	0.05	0.056	0.886	0.376
H3	PU <--TRU	0.132	0.04	3.281	**
H4	RI <--TRU	0.049	0.039	1.266	0.205
H5	PU <--EA	0.46	0.078	5.874	***
H6	RI <--EA	0.518	0.086	6.053	***
H7	RI <--PU	0.4	0.081	4.925	***
H8	PU<--SATIS	0	0.034	-0.007	0.994
H9	RI <--SATIS	0.017	0.033	0.517	0.605

Notes: 1.\*\*\*:  $p<0.001$ , \*\*:  $p<0.01$ . 2. SK: Subjective knowledge; ST: Social trust; PU: Perceived usefulness; ATT: Attitude; EA: Environmental attitude; RI: Repurchase intention.

The standardized total effects of antecedents are calculated (Table 4), a 1000 times bootstrap (percentile method)

results show all total effects are significant ( $p=0.01$ ). Among three unobserved exogenous variables, environmental attitude has the most powerful effects (0.518) on repurchase intention, followed by subjective knowledge (0.252). The total impacts of social trust is the least (0.09).

Table 4 Standardized total effects

Explained variable	ST	SK	EA	PU
PU	0.179**	0.511**	0.34**	0**
RI	0.09**	0.252**	0.518**	0.494**

Note: 1. \*\*:  $p < 0.01$ ; 2. SK: Subjective knowledge; ST: Social trust; PU: Perceived usefulness; ATT: Attitude; EA: Environmental attitude; RI: Repurchase intention.

#### 4. Discuss and implication

In this study, a survey is conducted among residents in Sino-Singapore Tianjin Eco-city to explore the determinants of Eco-city residents' repurchase intention. Residents' subjective knowledge, perceived usefulness of GRB and their environmental attitude are proved to predict Eco-city residents' repurchase intention. However, social trust is found to have ineligible impact on their repurchase intention. This is different from the study among residents who don't have purchase and living experiences in GRB [4], where trust is one of the important determinants of purchase intention. Since those residents don't have direct living experiences in GRB, their intentions rely partly on indirect resources like social trust. Once direct experiences become available and assist Eco-city residents' decision making, the role of trust would be weakened. In addition, Eco-city residents' occupancy satisfaction is investigated. Unexpectedly, it's found to have no impacts on Eco-city residents' repurchase intention.

The study contributes to the literature by adding knowledge to explain repurchase intention of GRBs and deep insight into residents' satisfaction of the GRBs in operation phase in Eco-city.

Further analysis could be done to examine the role of occupancy satisfaction as moderator or mediator. Though preliminary results show it is not determinant of Eco-city residents' repurchase intention, it may moderate or mediate the relationships between determinants and repurchase intention.

#### References

- [1] China Society for Urban Studies C. China Green Building 2016. China Architecture and Building Press. 2016.
- [2] China Association of Building Energy Efficiency C. Report on China Building Energy Consumption 2016 ( in Chinese). 2016.
- [3] Darko A, Chan APC. Review of barriers to green building adoption. Sustainable Development. in press:n/a-n/a.
- [4] Liu Y, Hong Z, Zhu J, Yan J, Qi J, Liu P. Promoting green residential buildings: Residents' environmental attitude, subjective knowledge, and social trust matter. Energy Policy. 2018;112:152-61.
- [5] Barnett J, Cooper H, Senior V. Belief in public efficacy, trust, and attitudes toward modern genetic science. Risk Analysis. 2007;27:921-33.
- [6] Ross VL, Fielding KS, Louis WR. Social trust, risk perceptions and public acceptance of recycled water: Testing a social-psychological model. Journal of Environmental Management. 2014;137:61-8.
- [7] Rousseau DM, Sitkin SB, Burt RS, Camerer C. Introduction to Special Topic Forum: Not so Different after All: A Cross-Discipline View of Trust. Academy of Management Review. 1998;23:393-404.
- [8] Katsuya T. Public response to the Tokai nuclear accident. Risk Analysis An Official Publication of the Society for Risk Analysis. 2001;21:1039.
- [9] Allen JG, Macnaughton P, Laurent JGC, Flanagan SS, Eitland ES, Spengler JD. Green Buildings and Health. Current Environmental Health Reports. 2015;2:250-8.
- [10] Hawcroft LJ, Milfont TL. The use (and abuse) of the new environmental paradigm scale over the last 30 years: A meta-analysis ☆. Journal of Environmental Psychology. 2010;30:143-58.
- [11] Liao C, Lin HN, Luo MM, Chea S. Factors influencing online shoppers' repurchase intentions: The roles of satisfaction and regret. Information & Management. 2016.

- [12] Lee H, Choi SY, Kang YS. Formation of e-satisfaction and repurchase intention: Moderating roles of computer self-efficacy and computer anxiety. *Expert Systems with Applications*. 2009;36:7848-59.