How Homebuyers' Cognition and Affect Shape Their Attitude on Green Buildings

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Highlights:

1. The study finds the complex relationship of affect, WTP behavior, and cognition.
2. Cognitive factors directly or indirectly influence WTP.
3. Affective factors such as trust have a moderator role in shaping WTP.
4. The study identifies key determinants and critical pathways that influence WTP.

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1 Introduction

Human-induced climate change influence 3.3-3.6 billion people living in highly vulnerable areas. The construction industry, a significant contributor to the effect, is responsible for approximately 36% of global energy consumption and 39% of global carbon dioxide emissions (IEA, 2019). Energy-efficient buildings are crucial to address the climate challenge (MacNaughton et al., 2018). Green buildings emerge as a technical solution to reduce energy consumption and air pollution in the construction sector (Fan and Wu, 2020; Han et al., 2022).

Accordingly, the global green building movement has gained worldwide momentum. The literature outlines four milestones in the progression of the green building movement: *the progression of institutional organization*, *professional association*, *public policy*, and *public behavior* (Zhao et al., 2019). As the final milestone, public behavior refers to the adoption of green building practices, highlighting the market acceptance by both developers and homebuyers. Research on developers' acceptance has demonstrated that such investments are profitable through mechanisms like price premiums, higher occupancy rates, and enhanced corporate image (Kahn and Kok, 2014; Eichholtz et al., 2010; Isa et al., 2013). Empirical studies also indicate that green building projects can yield price premiums ranging 10-31% (Fuerst and McAllister, 2011; Qian et al., 2016), while incremental costs are less than 12.5%. As a result, for example in China, new development of green homes has increased from 4 million square meters in 2012 to 2 billion square

meters in 2021. On the other side, research on homebuyers' acceptance demonstrates a low willingness to pay (WTP) for green buildings (Dolsak et al., 2020). The WTP refers to the maximum amount a homebuyer is willing to spend on green buildings. Homebuyers' attitude significantly influences their WTP (Durdyev et al., 2022; Zahan et al., 2020); however, most WTP-related studies primarily focus on factors like homebuyers' knowledge or awareness and overlook the comprehensive interactions of the factors in shaping their attitude toward green buildings.

Therefore, the objective of this study is to examine homebuyers' attitude mechanisms which shape their low WTP on green buildings. Although WTP is impacted by many factors that interact with each other across the decision making of homebuyers, a knowledge gap remains about how these factors interlay. This study uses an ABC (Affect, Behavior, Cognition) attitude model to explore the interactions of cognitive and affective factors and identify the determinants on WTP. This study applies a survey approach with third-order Partial Least Squares Structural Equation Model (PLS-SEM) analytical techniques to test the hypotheses and verify these relationships.

2 Literature Review

2.1 Green buildings

Green buildings represent sustainable development by reducing carbon emissions and improving residents' quality of life (Chang et al., 2016). They consume fewer resources and provide better indoor comfort, safety, and health for occupants, minimizing harm to both the environment and human health (Li et al., 2018; Gabay et al., 2014). Economically, green buildings lead to higher energy efficiency, lower water and electricity expenses through tax exemptions, reduce operational costs due to superior design, and enhanced productivity for occupants (Portnov et al., 2018). Environmentally, green buildings improve indoor air quality, lighting conditions, ventilation, and thermal comfort, providing a more pleasant living experience (Hu et al., 2016). They reduce harmful air pollutants and improve public health. Sustainable land use in green buildings also helps increase urban biodiversity and protect ecosystems (Henry and Frascaria-Lacoste, 2012). Socially, green buildings contribute to personal image enhancement, improved social status, and recognition within society for residents (Zhao and Chen, 2021).

2.2 WTP for green buildings

WTP represents the maximum price a consumer is willing to pay for a special goods or services, reflecting their subjective evaluation of its value (Mitchell, 1999). In the context of the green building market, a key research priority is to understand the affordability of these premiums for homebuyers (Zhang et al., 2016). Most research indicates that consumers are generally willing to pay a price premium for green buildings within the range of 0-10% (Ofek and Portnov, 2020; Zalejska-Jonsson, 2018). Their WTP for green buildings is influenced by a variety of factors, including their awareness of green building benefits. The high upfront cost of green buildings and the dispersion nature of their lifecycle benefits can make it difficult for homebuyers to fully perceive their value (Portnov et al., 2018). A lack of relevant knowledge about green buildings can hinder their ability to evaluate the potential benefits, such as improved indoor air quality,

enhancing living comfort, and reduced utility costs (Portnov et al., 2018), thereby suppressing WTP. Studies have shown that a deeper understanding of green buildings can significantly increase WTP (Zhang et al., 2016). The affective responses towards green buildings, particularly trust, is also a critical determinant of WTP. This trust encompasses confidence in the quality of green buildings, trust in green rating agencies, and trust in the government (Liu et al., 2018; Student et al., 2017; Kumah et al., 2022). Sociodemographic characteristics of consumers, such as income and education level, further shape consumers' WTP (Fuerst and Shimizu, 2016). Apart from the green features the traditional characteristic of buildings, like construction quality, location, and transportation convenience, play a role in consumer decision-making (Hu et al., 2016). Moreover, variations in consumers' WTP for green buildings exist due to different preferences for green benefits. Some consumers may prioritize economic advantages and be more willing to invest in energy conservation, while others may value personal environmental benefits and be more willing to pay a premium for an improved living environment (Ofek et al., 2018; Chau et al.,2010).

2.3 ABC attitude model

Attitude is a psychological evaluation of objects, characterized by dimensions such as positivity and negativity, joy and sorrow, appeal and repulsion (Ajzen, 2001). The ABC attitude model, introduced by Hoffland and Luxembourg in 1960, seeks to elucidate the formation of consumer attitudes by examining three key psychological dimensions: affect, behavior, and cognition (Breckler, 1984; Eagly and Chaiken, 1997; Fishbein, 1977). Sears et al. (1985) expanded on these dimensions within the context of attitude components, outlining that affect, behavior, and cognition all contribute to shape consumer attitudes. Affect encompasses consumers' emotional responses and feelings, behavior relates to their actions towards the subject of the attitude, and cognition refers to an individual's knowledge and beliefs about a subject. In the ABC attitude model, the relationship between these dimensions is multifaceted. At the standard learning level, cognition influences behavior by affecting affect. At the low intervention level, cognition affects affect through behavior. At the experiential level, affect can influence cognition by shaping behavior. The ABC attitude model serves as a conceptual framework for understanding the intricate relationships between affective, behavioral, and cognitive attitude.

Therefore, homebuyers' cognitive attitudes on green buildings directly shape their WTP and indirectly influence WTP through affective attitudes. Additionally, at lower levels of intervention and experiential engagement, the cognition gained from past green building experiences further impacts consumers' cognitive attitudes towards these buildings, which in turn affects their WTP.

3 Model Development

The ABC attitude model in this study includes three perspectives for affect, behavior, and cognition. The affective factor is trust; the behavioral factor is measured by the WTP; and the cognitive factors are green knowledge, green experience, perceived benefits, and perceived risks. The model hypothesizes that the cognitive factors directly influence WTP, while the affective

factor serves as a moderator. Overall, 13 hypotheses are formulated and tested. Figure 1 visualizes the structure of our ABC attitude model and the relationships among factors.

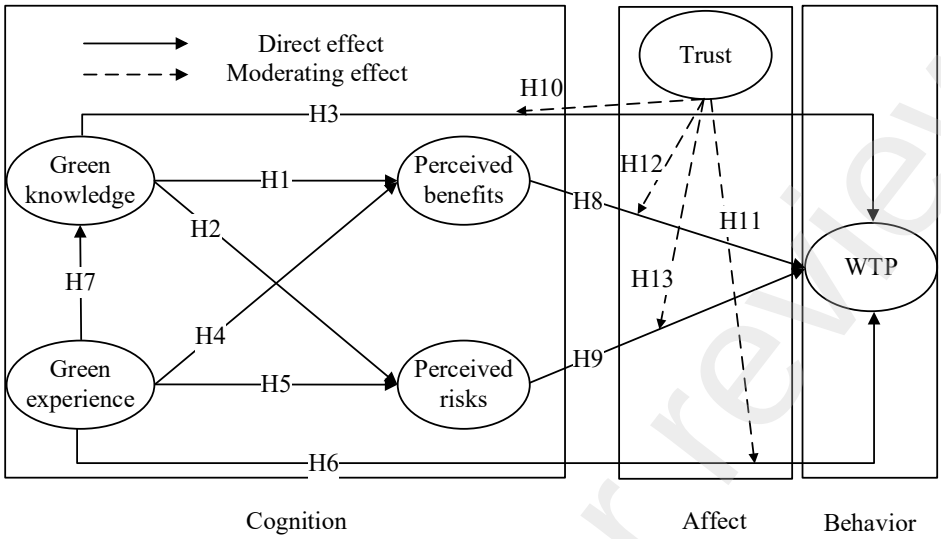

Figure 1. ABC attitude model and its testable hypotheses

3.1 Cognitive factors

3.1.1 The impact of green knowledge

Existing research shows a correlation between consumers' green knowledge proficiency and their perceptions of product benefits and risks. Wang et al. (2019) found that consumers with greater knowledge about nuclear energy are more likely to perceive the energy positively. The study of Shank et al. (2021) indicates that individuals with prior knowledge of smart home products are more likely to perceive them as advantageous. Cai et al. (2022) pointed out that consumers' understanding and perception of benefits and risks influence their behavioral intentions toward Ghost Kitchen highlighting the role of knowledge in augmenting perceived benefits and reducing perceived risks.. Hence, we hypothesize:

Hypothesis 1 (H1): Green knowledge positively influences perceived benefits.
Hypothesis 2 (H2): Green knowledge negatively influences perceived risks.

In addition, consumers' knowledge of products significantly impacts their WTP. This insight applies directly to WTP for green buildings, as many studies consistently show that as consumers gain more knowledge about green buildings, they become more familiar with their concept and advantages over traditional buildings. The increased understanding leads to a higher WTP for green buildings (Portnov et al., 2018; Ofek et al., 2020). Thus, we hypothesize:

Hypothesis 3 (H3): Green knowledge positively influences WTP.

3.1.2 The impact of green experience

Green experience refers to direct, unmediated interactions with green buildings, without intermediaries. The direct experience allows consumers to form firsthand impressions and assess tangible benefits and drawbacks (West and Gibson, 1966). Research consistently shows that people's perceptions of hazards and benefits are influenced by their actual experience with a product or service. For example, individuals who participate in traditional religious festivals develop positive perceptions of the benefits, which in turn contributes to the growth of the tourism sector (Lee et al., 2021). The study on the influence of leisure experience on behavioral intentions reveals that positive experience enhances perceived returns (Shen et al., 2020). The experience is negatively correlated with both product-related and financial risks. Thus, we hypothesize:

Hypothesis 4 (H4): Green experience positively influences perceived benefits.
Hypothesis 5 (H5): Green experience negatively influences perceived risks.

Consumers' past product experiences shape their shopping decision making (Han, 2019). Studies show that residents living in green buildings exhibit a notably higher WTP than those living in traditional buildings (Zalejska-Jonsson, 2014). Even low-income homebuyers who have involved in green buildings show a higher WTP, indicating that limited financial resources do not hinder their interest in green buildings (Fuerst and Shimizu, 2016). Residents in green buildings have a better understanding of green attributes while residents in traditional buildings lack a clear motivation (Hu et al., 2016). Thus, we hypothesize:

Hypothesis 6 (H6): Green experience positively influences WTP.

Consumers' product experiences often influence their product knowledge. Keng et al.'s (2014) study on brand attribute found that the sequence in which consumers experience a product can significantly influence their knowledge and attitudes (Keng et al., 2014). Similarly, Han's (2019) research on organic cotton clothes echoes these findings, demonstrating that direct experience is a significant predictor of subjective knowledge. Thus, we hypothesize:

Hypothesis 7 (H7): Green experience positively influences green knowledge.

3.1.3 The impact of perceived benefits and risks

According to theory of perceived value, the concept is formed by the combination of perceived benefit and perceived effort (Zeithaml, 1988). Perceived value is the customer's overall assessment of a product or service, considering both its benefits derived from it and the effort required to obtain those benefits. In the context of green buildings, this theory suggests that consumers are likely to adopt green technologies when they perceive sufficient value from them. Li et al.'s (2019) study on the psychological account method found a positive correlation between perceived income and WTP, as well as a negative correlation between perceived effort and WTP. A study from China found a positive correlation between perceived benefits of nuclear energy and its public acceptance (Wang et al., 2019). Similarly, another consumer study in Malaysian found that perceived benefits

play a significant role in influencing the willingness to repurchase dining car products (Loh and Hassan, 2022). Lee's (2008) study found that perceived revenue is the most crucial positive predictor for custom willing to use online banking services. Thus, we hypothesize:

Hypothesis 8 (H8): Homebuyers' perceived benefits of green buildings positively influence WTP.

Based on the theory of perceived value, when the effort required to obtain the benefits of a product or service is perceived as high, consumers are less likely to engage in the desired behavior. Yue et al. (2021) developed a theoretical model based on double-entry accounting perspective and found that perceived sacrifices have a negative correlation with green consumption intention. Thus, we hypothesize:

Hypothesis 9 (H9): Homebuyers' perceived risks of green buildings negatively influence WTP.

3.2 Affective factors

According to the ABC attitude model, trust is considered as an affective factor. Trust is anticipated to play a crucial role in shaping consumers' WTP for green buildings. Green buildings are a new architectural concept, and the limited acceptance is often due to a lack of trust in their benefits and quality. While knowledge of green products promotes purchase intention, trust acts as a moderator between consumers' knowledge and their intention to purchase green products. Chen et al.'s (2023) study on online paid courses found that trust acts as a mediator between previous learning experience and personal trial experience, influencing consumer's WTP. Liu et al.'s (2021) study revealed that trust positively moderates the impact of perceived benefits and negatively moderates the impact of perceived risks on public acceptance of carbon capture, utilization, and storage. Thus, we hypothesize:

Hypothesis 10 (H10): *Trust positively moderates the impact of green knowledge on WTP.*
Hypothesis 11 (H11): *Trust positively moderates the impact of green experience on WTP.*
Hypothesis 12 (H12): *Trust positively moderates the impact of perceived benefits on WTP.*
Hypothesis 13 (H13): *Trust negatively moderates the impact of perceived risks on WTP.*

4 Methods and Data

This study employed a survey method to build the ABC attitude model. The questionnaire includes six latent variables and 22 observable variables, as detailed in Table 1. All observable variables were measured using a seven-point Likert scale, where 1 represents strongly disagree, and 7 represents strongly agree. The survey also collects respondent's unique sociodemographic characteristics. The questionnaire was created based on established scales and went through two rounds of improvements: the expert review and a pilot study by a modest sample of participants.

Table 1. Indicators and Measurement System

Latent Variable	Observed Variable	References

Green experience（GE）	GE1: How long have you been living in a green building?	
Green knowledge (GK)	GK1: Do you understand the definition of green building? GK2: Do you understand the advantages of green building compared to ordinary housing? GK3: Do you understand that green building is more expensive than ordinary housing under the same conditions? GK4: Do you know any policy knowledge about green building?	(Huang, 2023; Yang and Zhang, 2023)
Perceived benefits（PB）	PB1: Green building reduces household water and electricity expenses. PB2: Green building can appreciate in value in the future and has investment value. PB3: Green building has improved indoor air quality. PB4: Green building helps reduce carbon emissions. PB5: Green building improves energy efficiency and saves energy use. PB6: Green building improves the socio-economic status of residents.	(Li et al., 2018; Ofek et al., 2018)
Perceived risk（PR）	PR1: Green building is too expensive to afford. PR2: The full life cycle benefit return period of green building is too long and may be difficult to achieve. PR3: Green building may not achieve the functional level described by the developer. PR4: There may be hidden dangers in the construction quality of green residential buildings.	(Zhao and Chen, 2021; Kumah et al., 2022)
Trust（TR）	TR1: I believe in the quality of the evaluation standards established by official institutions. TR2: I believe in the evaluation process of green building by experts. TR3: I believe in the advertising and promotion of developers.	(Durdyev et al., 2022; Zhao and Chen, 2021; Kumah et al., 2022)
Willingness to pay（WTP）	WTP1: Compared to traditional architecture, I prefer green building. WTP2: Next time I buy a house, I will prioritize green building. WTP3: I am willing to spend more money to purchase a green house. WTP4: I would like to recommend green residential products to my family and friends. WTP5: How much premium are you willing to pay for green building compared to traditional houses of the same type?	(Zahan et al., 2020; kumah et al., 2022; Huang, 2023)

The survey was distributed through an online platform and received 246 responses. After rigorous validation, 9 responses with uniform and repeated responses were excluded, as well as 27 from respondents under age 20 to mitigate bias related to housing cost perceptions. Overall, a final dataset of 210 valid responses were used for data analysis. Table 2 lists the demographic and

socioeconomic distributions of the participants. The distributions demonstrate good representativeness of population, consistent with existing studies. In the sample, males show a slightly higher WTP than females, consistent with research suggesting that females are more cautious and risk-averse (Khan et al., 2020). Individuals aged 30+ have a significantly higher WTP than younger ones, likely due to greater environmental awareness and higher economic capacity (Guo et al., 2022). Higher education correlates with increased WTP, but at advanced levels, WTP decreases as individuals become more discerning about green benefits (Robinson et al., 2016). WTP also rises with income, but the effect diminishes over time (Li et al., 2018; He et al., 2021). Married individuals and those with children show higher WTP, but families with two or more children exhibit lower WTP due to financial burdens (Li et al., 2018; Wu et al., 2022). Homeowners have higher WTP than non-homeowners, and those with green experience, especially for 3-6 years, show the highest WTP. WTP also increases with higher green building ratings.

Table 2. Sample Statistical Information

Variable	Option	Number	%	WTP score
Gender	Male	93	44.3	5.55
	Female	117	55.7	5.27
Age	20-29	79	37.6	5.05
	30-39	105	50.0	5.59
	40-49	20	9.5	5.55
	50 or above	6	2.4	6.1
Education	High school or below	8	3.8	4.65
	Junior college education	23	10.9	5.45
	Undergraduate degree	157	74.7	5.43
	Graduate degree or above	22	10.4	5.37
Household annual income	100000 RMB or less	22	10.4	4.59
	100000-300000 RMB	120	57.2	5.35
	300000-500000 RMB	45	21.6	5.75
	500000 RMB or above	23	10.8	5.74
Marital status	Married	161	76.6	5.58
	Unmarried	49	23.4	4.80
Number of children	0	46	21.9	4.94
	1	120	57.1	5.60
	2 or above	44	20.9	5.34
Occupation type	Government or state-owned enterprises	39	18.5	5.54
	private enterprise	102	48.5	5.59
	Education, research or health industry	21	10.0	5.21
	Professional technical workers	15	7.1	5.83

	Production and transportation equipment operators	8	3.8	4.38
	Business, service, and sales personnel	9	4.2	5.00
	Students	15	7.1	4.4
	Retire	1	0.4	4.4
Number of residences	0	25	11.9	4.58
	1	146	69.5	5.42
	2 or above	39	18.5	5.85
Living experience	Traditional homes	76	36.2	4.91
	Green homes	134	63.8	5.68
Green residential residence duration	Never lived before	76	36.2	4.91
	0-3 years	65	30.9	5.58
	3-6 years	39	18.6	5.72
	6 years or above	30	14.3	5.83
Green building rating	Traditional residence	76	36.2	4.91
	One-star level	28	13.3	5.49
	Two-star level	70	33.3	5.60
	Three-star level	36	17.2	5.97
Total		210	100	5.40

5 Results and Discussions

5.1 Reliability, validity analysis and goodness of fit test

Table 3 lists the results of model reliability and validity analysis. The Cronbach's Alpha (CA) coefficients for the six latent variables (green knowledge, green experience, perceived benefits, perceived risks, trust, and WTP) are all greater than 0.7. Their Composite Reliability (CR) coefficients are also greater than 0.7, indicating satisfactory reliability of the questionnaire. In terms of validity, all CR coefficients are greater than 0.7, and the Average Variance Extracted (AVE) for each latent variable is greater than 0.6, indicating a good level of convergent validity. Furthermore, the square root of the AVE for each latent variable is higher than the correlation between the variable and other latent variables, indicating a good level of discriminant validity (Table 4). Overall, the model fitting analysis demonstrates good reliability and validity.

Table 3 Reliability and Validity Analysis

Latent Variable	Observed variable	Loading	CA	Rho_A	CR	AVE
GE	GE1	1.000	1.000	1.000	1.000	1.000
GK	GK1	0.884	0.888	0.894	0.923	0.75
	GK2	0.869				
	GK3	0.811				
	GK4	0.898				

PB	PB1	0.904	0.922	0.926	0.940	0.722
	PB2	0.873				
	PB3	0.863				
	PB4	0.848				
	PB5	0.803				
	PB6	0.801				
PR	PR1	0.824	0.866	0.884	0.907	0.709
	PR2	0.879				
	PR3	0.828				
	PR4	0.836				
TR	TR1	0.754	0.738	0.782	0.848	0.650
	TR2	0.804				
	TR3	0.857				
WTP	WTP1	0.811	0.865	0.874	0.903	0.651
	WTP2	0.817				
	WTP3	0.837				
	WTP4	0.84				
	WTP5	0.724				

Table 4. Discrimination Validity Analysis

	GE	GK	PB	PR	TR	WTP
GE	**1.000**					
GK	0.401	**0.866**				
PB	0.228	0.556	**0.850**			
PR	-0.260	-0.448	-0.384	**0.842**		
TR	0.168	0.350	0.164	-0.271	**0.806**	
WTP	0.357	0.642	0.602	-0.497	0.348	**0.807**

For the goodness of fit assessment of the structural model, the study employs the Goodness of Fit (GOF) value as the fitting adequacy test indicator, with the specific formula being:

$$GOF = \sqrt{\overline{communality} \times \overline{R^2}} \quad (1)$$

where, *communality* refers to the average of the commonality across all construct cross-validations, with a value of 0.563. And $\overline{R^2}$ refers to the mean of all endogenous variables, with a value of

0.344. Therefore, the GOF value (0.44) exceeds the required threshold of 0.36, indicating a high level of goodness-of-fit.

5.2 Analyses on direct effects

The model testing results are displayed in Figure 2 and hypothesis testing results are listed in Table 5. The PLS-SEM model was computed in SmartPLS 3 software. The results show that green knowledge positively influences WTP, perceived benefits, and perceived risks, supporting H1, H2, and H3. This suggests that the more homebuyers know about green buildings, the more they acknowledge the benefits and risks, and the more willing they are to pay for them. However, green experience does not significantly influence perceived benefits or risks, rejecting H4 and H5. This could be attributed to the long payback period and the intangible nature of certain green building benefits, such as noise reduction and improved indoor air quality, which may not be immediately noticeable to homebuyers (Portnov et al., 2018; Chau et al., 2010). Despite this, green experience positively influences WTP and green knowledge, supporting H6 and H7. Noteworthy is that the influence from green experience on green knowledge is very strong (Coeff. = 0.834, p<0.01). This aligns with experiential learning theory which posits that practical experience is a key source of knowledge acquisition (Dewey, 1903). Through lived experience, homebuyers gain insights into green building features and technologies. In addition, the results confirm that perceived benefits positively influence WTP, and perceived risks negatively impact WTP, supporting H8 and H9. This underscores the importance of perceived benefits in boosting WTP and the deterrent effect of perceived risks. Overall, all the four cognitive factors directly influence WTP, although those direct effects are not strong (coefficients < 0.3).

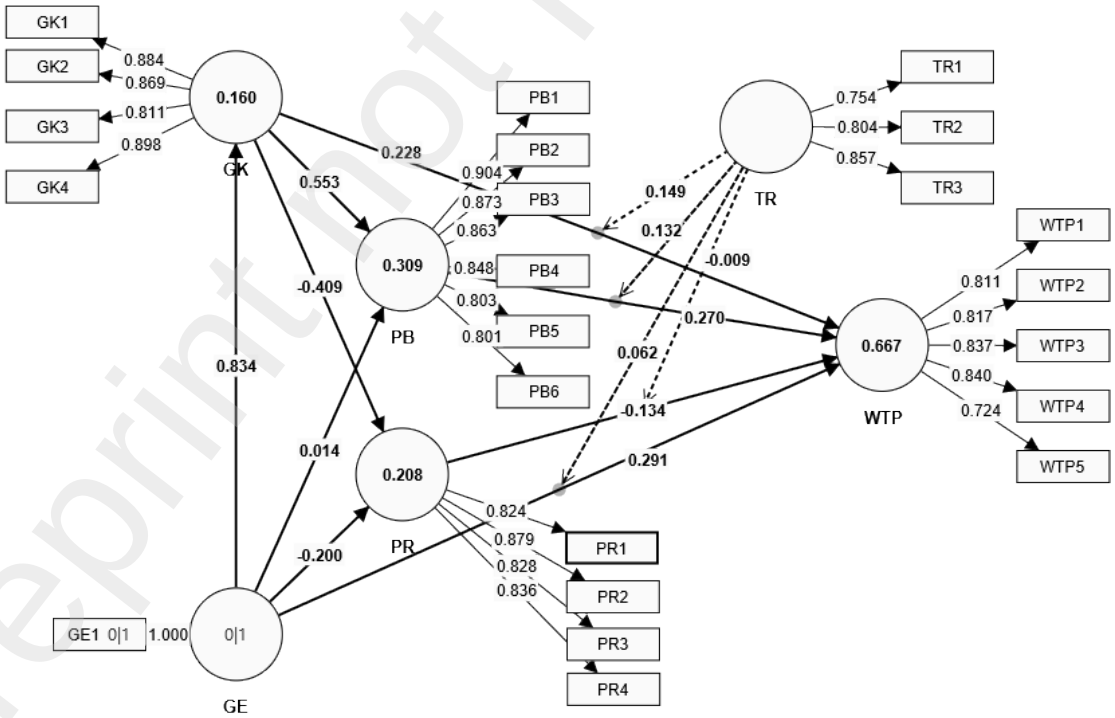

Figure 2. Results of hypothesis test and path coefficient estimation.

Table 5. Hypothesis Tests for Cogntive Factors

Hypothesis	Path	Path Coefficient	*t*-value	*p*-value	Result
H1	GK -> PB	0.553	6.921	0.000	accepted
H2	GK -> PR	-0.409	6.798	0.000	accepted
H3	GK -> WTP	0.228	2.461	0.014	accepted
H4	GE -> PB	0.014	0.096	0.924	rejected
H5	GE -> PR	-0.200	1.406	0.160	rejected
H6	GE -> WTP	0.291	2.857	0.004	accepted
H7	GE -> GK	0.834	6.781	0.000	accepted
H8	PB -> WTP	0.270	3.570	0.000	accepted
H9	PR -> WTP	-0.134	2.105	0.035	accepted

5.3 Analyses on mediating effects

Table 6 presents the mediation effects and path analyses, offering deeper insights into the indirect relationships between green knowledge, experience, perceived benefits, perceived risks, and WTP. Green experience (Coeff. = 0.682, $p<0.01$) demonstrates a greater total effect on shaping WTP than green knowledge (Coeff. = 0.433, $p<0.01$) does, although both exhibit strong effects. Notably, green knowledge acts as a strong mediator, mediating the effects of green experience on WTP (Coeff. = 0.190, $p<0.01$), perceived benefits (Coeff. = 0.461, $p<0.01$), and perceived risks (Coeff. = -0.341, $p<0.01$). Almost half of the impact of green knowledge on WTP is mediated by perceived benefits (Coeff. = 0.149, $p<0.01$) and risks (Coeff. = 0.055, $p<0.01$). This suggests that as homebuyers become more informed about green building practices, they better recognize and appreciate the benefits, which in turn increases their WTP. Neither perceived benefits nor risks mediate the impact of green experience on WTP, indicating a weak mediating role for green experience. Combining findings of direct effects from section 5.2, this suggests that perceptions cannot be directly influenced by experience; rather, the effect should be through knowledge.

Table 6. Mediating Effect Analysis Results

Effects	Path	Path Coefficient	Boot LLCI	BOOT ULCI	*t*-value	*p*-value	VAF	Mediation
Total effect	GK -> WTP	0.433	0.256	0.660	4.118	0.00		
Direct effect	GK -> WTP	0.228	0.049	0.412	2.461	0.01		
Mediation effects	GK -> PB -> WTP	0.149	0.073	0.272	2.942	0.00	34.41%	Partial
	GK -> PR -> WTP	0.055	0.011	0.122	1.945	0.05	12.70%	No
Total effect	GE -> WTP	0.682	0.460	0.972	5.236	0.00		
Direct effect	GE -> WTP	0.291	0.100	0.502	2.857	0.00		
Mediation effects	GE -> GK -> WTP	0.190	0.043	0.366	2.311	0.02	27.86%	Partial
	GE -> GK -> PB -> WTP	0.125	0.055	0.245	2.524	0.01	18.33%	No
	GE -> GK -> PR -> WTP	0.046	0.009	0.106	1.844	0.07	6.74%	No
	GE -> PB -> WTP	0.004	-0.082	0.085	0.088	0.93	0.59%	No
	GE -> PR -> WTP	0.027	-0.011	0.083	1.107	0.27	3.96%	No
Total effect	GE -> PB	0.475	0.191	0.731	3.483	0.00		
Direct effect	GE -> PB	0.014	-0.272	0.288	0.096	0.92		
Mediation effect	GE -> GK -> PB	0.461	0.267	0.685	4.335	0.00	97.05%	Full
Total effect	GE -> PR	-0.541	-0.811	-0.281	4.033	0.00		
Direct effect	GE -> PR	-0.200	-0.482	0.076	1.406	0.16		
Mediation effect	GE -> GK -> PR	-0.341	-0.499	-0.204	4.464	0.00	63.03%	Partial

5.4 Analyses on moderating effects

Table 7 presents the moderating effect analysis of trust (an affective factor). The results show that trust enhances the impact of green knowledge on WTP (Coeff. = 0.149, p<0.05), supporting H10. This suggests when homebuyers trust that the information they have gained about green buildings is accurate and reliable, they are more likely to act on that knowledge and feel secure in their purchase decisions. Trust also enhances the impact of perceived benefits on WTP (Coeff. = 0.132, p<0.05), supporting H12. Essentially, trust strengthens the relationship between what consumers know and how much they are willing to invest and amplifies the perceived value. On the other hand, the results do not support trust as a moderator between experience and WTP, indicating that direct experience, for example, living in a green building, provides tangible, first-hand knowledge independently of trust. In other words, experience allows homebuyers to establish understanding of green attributes themselves, reducing the reliance on external assurances or promises. The results do not support trust's moderating role between perceived risks and WTP, suggesting that homebuyers remain cautious in their decision-making. This is consistent with existing studies that consumers often prioritize tangible, direct concerns—such as financial or functional risks—over abstract factors like trust, especially in high-risk scenarios (Gal and Rucker, 2018). Even if trust is high, the perceived risks related to cost, performance, or future uncertainties may still outweigh the influence of trust, as the focus on potential losses overshadows the mitigating effect that trust may have.

Table 7 Hypothesis Tests for Affective Factor

Hypotheses	Path	Path Coefficient	t-value	p-value	Results
H10	TR x GK -> WTP	0.149	2.035	0.042	accepted
H11	TR x GE -> WTP	0.062	0.531	0.595	rejected
H12	TR x PB -> WTP	0.132	2.261	0.024	accepted
H13	TR x PR -> WTP	-0.009	0.127	0.899	rejected

5.5 Synthesis of the mechanisms shaping WTP

Figure 3 illustrates the mechanisms driving WTP, incorporating direct effects, mediating effects, and moderating effects. First, the findings highlight a crucial role of homebuyers' green experience in shaping their WTP. With a total influence coefficient of 0.606—higher than any other factor in the model—the statistical evidence clearly indicates that having residential experience with green buildings is a key driver of WTP. Green experience impacts WTP through three interconnected pathways: (1) it has a direct, significant effect on WTP (0.291); (2) it enhances green knowledge, which in turn influences WTP (0.190); and (3) it increases green knowledge, which shapes perceived benefits, ultimately affecting WTP (0.125). Second, green knowledge demonstrates a notable impact, with a total influence coefficient of 0.337, operating through two pathways: (1) green knowledge has a direct but insignificant effect on consumers' WTP (0.228); and (2) it affects perceived benefits associated with green buildings, which subsequently influences consumers' WTP (0.149). Third, perceived benefits significantly influence WTP with a coefficient of 0.270,

highlighting the importance of expected advantages in purchase decisions. However, perceived risk has a minimal impact, with a coefficient of -0.134, suggesting homebuyers may prioritize the benefits of green buildings over potential risks. Fourth, trust enhances the effect of green knowledge and perceived benefits on WTP. This suggests that homebuyers may base their WTP on concrete evaluations of risks rather than relying solely on their trust in the product or service.

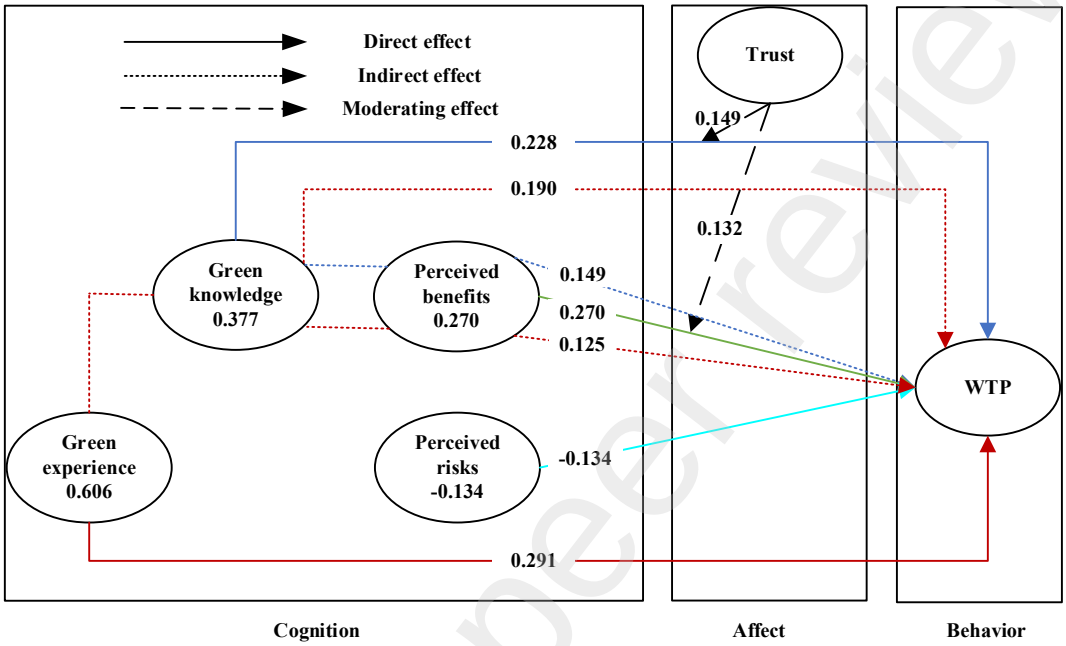

Figure 3. The key drivers and critical pathways

6 Conclusions

Amid the global green building movement, countries like China, India, and Brazil have recently embraced these initiatives, highlighting the need to refine green building practices in the emerging markets. While significant research has focused on developer behaviors, there is a critical need to explore homebuyers' decisions. This study, employing the ABC attitude model, addresses this gap and enhances our understanding of homebuyers' WTP for green buildings. Findings from this study contribute to the literature of the green building movement, particularly regarding the movement's final milestone about public behavior and acceptance.

The study concludes the following key findings. (1) Cognitive factors, such as green experience, green knowledge, and perceived benefits and risks, directly impact WTP, while affective factors like trust moderate the impacts. (2) Green experience exerts the strongest impact on WTP, with about half of this impact mediated through green knowledge. Experience, being direct and immediate, shapes WTP based on actual, lived outcomes, making trust less crucial in influencing decisions. (3) Green knowledge also has a strong impact on WTP, primarily mediated by perceived benefits and risks, with trust enhancing the effect of knowledge. (3) Perceived benefits slightly

outweigh perceived risks in their impact on WTP, although both effects are moderate. Trust accelerates the impact of perceived benefits but does not influence the impact of perceived risks.

This study has limitations and informs future studies. The use of first-order indicators for the ABC variables may not fully capture the intricate relationships and nuances of the constructs. Future research could benefit from the use of second-order or higher-order indicators, which can delineate the inter-variable relationships more accurately. This would provide a more detailed understanding of how cognition, emotion, and behavior interact to shape consumer attitudes and behaviors towards green buildings.

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