A SYSTEMATIC REVIEW ON FACTORS INFLUENCING CONSUMERS' PURCHASING DECISIONS IN GREEN BUILDINGS

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Abstract: In the context of the ongoing climate change crisis resulting from anthropogenic activities and the current global endeavours to slow down or even reverse these processes, the role played by green buildings assumes paramount significance. Public acceptance of and Willingness To Pay (WTP) for green buildings is crucial for green buildings to be integrated into society, thereby contributing to the mitigation of the climate change crisis. The PRISMA protocol was used as the primary procedure for article screening and selection. This review paper systematically reviews 27 peer-reviewed articles in the field of green buildings. This paper is based on various theoretical models such as the Technology Acceptance Model (TAM), the Theory of Planned Behaviour (TPB), and the Value-Belief-Norm Theory (VBN). It further employs content analysis methods to comprehensively extract and analyse environmental, psychological, and demographic factors that influence consumers in green building consumption, aiming to address existing research gaps. The findings can help construction experts and government officials to analyse the residents' decision to purchase green buildings.

Keywords: Green buildings, WTP, demographic factors, psychological factors, contextual factors.

Introduction

Human society's development impacts the environment through energy consumption, resource exploitation, and pollutant emissions. The real estate sector significantly contributes to the greenhouse effect, accounting for 37% of global emissions, as reported in the 2021 Global Status Report for Buildings and Construction by UNEP and GlobalABC. To mitigate this impact, it is imperative to adopt energy-efficient and low-carbon practices in the construction industry. The definitions of green buildings vary across different international contexts. While GBs have been characterised in a variety of ways, the most prevalent is that they are "healthy and resource-efficient dwellings that are designed and built based on environmental principles" (Kibert, 2016).

Green buildings offer three major advantages in environmental, economic, and social aspects. Price premiums and market mechanisms have also promoted the adoption of green buildings (Eichholtz *et al*., 2010; Fuerst & McAllister, 2011; Jang *et al*., 2018). However, green buildings cannot completely replace traditional buildings due to consumers' limited awareness of new technologies, insufficient interaction with experts, and lack of supportive policies (Klockner, 2013). Economic and social sustainability is critical to environmental sustainability, so, Willingness To Pay (WTP) plays a key role in driving residential construction. Influenced by environmentally conscious choices and the promise of better returns or quality of life, consumers' WTP for

Green Buildings (GBs) is becoming increasingly important in the real estate industry. Although studies have been conducted exploring the WTP for GBs (Li *et al*., 2022), this area of research remains understudied (Liu *et al*., 2019). There is currently limited existing research on this topic, except for Joyram *et al*. (2022), which focuses on green building technologies such as insulation blocks. A comprehensive review of the factors that influence consumers' WTP for GBs is warranted.

It is of great significance to study the factors that influence consumers' willingness to pay for green buildings (Li *et al*., 2022). This research can promote the development of green buildings, help developers and decision makers better understand consumer needs, and establish effective incentive mechanisms. At the same time, green buildings help to reduce resource consumption and environmental pollution (Bungau *et al*., 2022). Studying willingness to pay can accelerate the adoption of green buildings and contribute to the achievement of the Sustainable Development Goals. The results of this study can optimise market strategies, enhance consumers' environmental awareness, support the economic value assessment of green buildings, and promote the development of related industries.

Based on empirical research results, environmental variables influence consumer behaviour in the construction industry. Research shows that factors such as green attributes, indoor air quality, and environmental awareness influence WTP (Njo *et al*., 2021). As Khan *et al*. (2020) found, energy-saving features are particularly appealing to potential homebuyers. Liu *et al*. (2019) demonstrated a link between improved operational performance of green residential buildings and an increase in residents' satisfaction and willingness to pay. Based on these findings, questions are asked:

• What are the contextual factors impacting consumers' WTP for green buildings?

Various psychological models have been developed to understand consumers' behavioural intentions such as the Technology Acceptance Model (TAM), Normative Activation Model (NAM), and Theory of Planned Behaviour (TPB). For example, Rajaee *et al*. (2019) extended the TAM framework by adding five additional factors: Environmental attitudes, subjective knowledge, social trust, social norms, and perceived costs. Zahan *et al*. (2020), Dinh *et al*. (2022), and Chanda *et al*. (2023) used an enhanced TPB framework to explore Bangladeshi consumers' buying intentions for GBs. Sang *et al*. (2020) combined TPB and NAM theory to test the hypothesis with data from 355 consumers in Shandong Province, China. Many scholars have also integrated psychological factors such as environmental concerns, perceived value, and environmental knowledge to enhance the explanatory power of these models (Durdyev & Tokbolat, 2022). These studies raise a question:

• What are the psychological factors impacting consumers' WTP for green buildings?

Empirical studies in the field of building have likewise tried to evaluate how demographic and individual determinants influence consumer behaviour. For instance, Wu *et al*. (2022) studied the impact of personal characteristics, housing prices, and real estate ownership on consumers' purchasing intention for greenhouses. Li *et al*. (2018c) researched human demographic variables such as age, gender, and family monthly income, across five Chinese first-tier cities. Khan *et al*. (2020) discovered that WTP for GBs is higher among males aged 51-60 with higher education levels. However, economic constraints may hinder the willingness of highly educated individuals. These findings lead to the question:

• What are those demographic factors impacting consumers' WTP for green buildings?

This paper is structured into three sections. Section 1: Introduction examines the current research on green building consumption and explains the systematic literature search method and content analysis used. Section 2 discussion: Showcases the results and outlines the research questions. Finally, Section 3 concludes by providing conclusions and discussing future research directions.

Review of Studies on Consumers' WTP for GBs

Willingness To Pay (WTP) is defined as the maximum price a buyer is willing to pay for a certain quantity of goods or services (Kalish & Nelson, 1991; Kohli & Mahajan, 1991; Wertenbroch & Skiera, 2002). In the context of green buildings, WTP plays a key role in purchasing decisions, as it determines whether consumers are willing to invest in sustainable features despite potentially higher upfront costs.

However, insufficient professional expertise in green technologies and methods leads to a weak understanding of the green building concept and a lack of awareness of the green tools and materials available, all of which hinders the implementation of green strategies (Huo & Yu, 2017). End-user understanding and behaviour are crucial to green facility success, which is no less crucial than passive technology application (Vives-Rego *et al*., 2015). Hewitt *et al*. (2016) revealed that the value-based frameworks cannot well predict the consumption behaviours of occupants in green buildings. So, it is important to understand the factors that influence consumers' willingness to pay for green buildings.

Green construction is on the rise to combat global environmental issues and resource depletion (Sarireh, 2021). Stakeholder engagement, involving customers, developers, and the public is vital for the green building industry's progress. Numerous studies have explored the roles and perspectives of stakeholders (designers, customers, suppliers, contractors, developers, end-users, the public, and the government) in the green building sector (Williams & Dair, 2007; Li *et al*., 2018a; Darko *et al*., 2019; He *et al*., 2021; Li *et al*., 2022), emphasising that stakeholder engagement is vital for advancing the green building industry.

To modify behaviours regarding green buildings, the paper aims to review and synthesise extant literature systematically, providing insight into what would enhance consumer readiness for a shift in consumer WTP regarding the adoption of green building practices. As documented in Table 1, most studies on determinants of individuals' green building consumption have deployed classical behavioural and innovation theories. However, results differ over sampling methods used, cross-sectional analysis, and interpretations of such mechanisms in diverse geographical contexts. While previous studies focus on stakeholders like builders and suppliers, no review has exclusively examined factors influencing consumers' WTP for green buildings. Thus, a comprehensive review of the published articles is essential to understand the current state of research and identify existing knowledge gaps.

Table 1: Overview of 27 related papers

Authors	Title	Theoretical Model/ Contextual Model	Psychological/ Demographic/ Contextual Variables	Sample Size and Data Collection	Data Analysis Method	Research Findings
Judge *et al.* (2019)	Using the theory of planned behaviour to predict intentions to purchase sustainable housing	TPB model	TPB variables, together with green consumer identity as a moderating variable	330 homebuyers from an online panel in Australia.	Hierarchical multiple regression	(1) The findings revealed that Social Norms (SN), attitudes, Perceived Behavioural Control (PBC), and green consumer identity strongly influence people's propensity to buy sustainable housing. (2) The impact of social norms on the intention to buy green housing is significantly moderated by green consumer identity. (3) The two most influential elements in determining WTP for green housing are familiarity with sustainability certifications and Social Norms (SN).
Sang *et al.* (2020)	Influencing factors of consumers' willingness to purchase green housing: A survey from Shandong Province, China	The research merged the model with the NAM models and TPB	TPB components include: ATT, SN, and PBC. NAM components include: Awareness of consequences, personal norms, and ascription of responsibility	355 valid replies to a questionnaire were received.	The PLS structural equation model analysis	(1) The study revealed that PN and PBC directly impact consumers' WTP for a green home. (2) Social Norms (SN) indirectly influence PN through PBC while PN is indirectly affected by awareness of consequences through the ascription of responsibility. (3) By incorporating both the Theory of Planned Behaviour (TPB) model and the Norm Activation Model (NAM), the theoretical framework significantly improves its predictive ability by considering both altruistic aspects and self-interest factors.

Author (Year)	Theory/Model	Variables	Data/Sample	Method	Findings
Zahan *et al.* (2020)	Extension of the model of TPB	Attitude, social norm, and perceived behaviour control Green housing purchase intention, environmental concern, and knowledge	319 valid responses from the questionnaire were received. Judgemental sampling and convenience sampling were used to gather the data.	The SEM approach	(1) The findings indicate that attitudes and perceived behavioural control are important drivers of consumers' green housing purchases. (2) In contrast, social norms and environmental knowledge do not directly influence the decision to purchase sustainable housing. Environmental knowledge and concern have an indirect impact on the intention to purchase sustainable housing.
Durdyev & Tokbolat (2022)	An adapted model from TPB	ATT, PBC, purchase intention for GB, encouragement around the potential clients, their environmental concern, marketing and promotion, government incentives, client's knowledge and concern	Surveying the population of Phnom Penh city.	Factor analysis combined with the structural equation modelling technique and multiple regression	(1) The study's results highlight that the strongest factor impacting the attitude toward purchasing green buildings is the people's environmental concern. (2) Marketing and promotion efforts, particularly word-of-mouth and promotional efforts have respectively, the greatest and second-greatest impact on attitude and purchase intention. (3) The second most influential drivers were client awareness and knowledge, as well as government incentives such as grants, soft loan incentives, and tax incentives.
Wu *et al.* (2022)	Demographic, socio-economic, and behavioural variables	Personal characteristics (gender, education, marriage, income), housing price, house number, WTP for green housing	Data was obtained from 1,338 urban inhabitants from 29 provinces in China.	Logit, probit, and probit models	(1) The results indicate that the number of housing assets significantly influences householders' WTP for greenhouses. People's WTP for a greenhouse increases if they own more houses. (2) Higher housing prices positively correlate with householders' WTP for greenhouses.

(3) Regarding householder characteristics, individuals with higher levels of education and unmarried status are more inclined to purchase greenhouses.

(4) Individual happiness may be influenced by housing wealth as a result of growing house prices. People with greater housing assets are more inclined to feel the joy that comes with increased wealth, which can influence householders' purchasing decisions.

| Li *et al.* (2019) | Chinese urban residents' willingness to pay for green housing based on double-entry mental accounting theory | The research investigated WTP for GH, employing two sets of experiments from the perspective of consumer behaviour theory (VBN and perceived value) and behavioural economics (Double-entry mental accounting theory, framing effects) | Perceived sacrifices, perceived benefits, double-entry mental accounting, additive, and subtractive option framing, value (Egoistic/altruistic/ecological), willingness to pay for green housing | 1,896 valid responses from 4 cities in China were obtained. The stratified random sampling method was used to collect data. | AMOS-based SEM analysis | (1) The results indicate that each component of benefits is considerably and positively connected with willingness to pay, whereas each component of sacrifices is both significantly and adversely correlated with WTP. The sensitivity coefficients for policy risk and functional risk are relatively substantial, indicating that willingness-to-pay is more susceptible to both functional and policy risk.

(2) Double-entry mental accounting can significantly moderate the relationship between residents' perceived value and their WTP.

(3) Resident values can act as a mediator between WTP and perceived benefits.

(4) Residents' WTP for GBs is higher with subtractive framing than with additive framing. |

Rosner *et al.* (2022)	Consumer's attitude, socio-demographic variables, and willingness to purchase green housing in Israel	A model adapted from TPB	ATT, PBC, environmental awareness, age, income, sex, WTP for green apartment	In experiment 1 (554 people), experiment 2 (308 married only, random sample), and experiment 3 (123 people aged 21-55), valid responses from an online survey were received.	The conjoint analysis/ the linear regression analysis	(1) The study demonstrates that there is no significant association between the preference for a greenhouse and socio-demographic characteristics. (2) Behavioural-cognitive variables exhibit a persistent connection throughout the investigation. (3) The primary elements influencing participants' choices were the additional costs, economic savings, and proposed policies. (4) People who are less environmentally conscious view the "green choice" as the wrong decision.
(Huang (2023)	Effects of consumer perception, attitude, and purchase intention on the willingness to pay for green building housing products	The Howard–Sheth and Howard models, CVM	Consumer perception, consumer attitude, consumer purchase intention, consumer WTP	892 valid responses from Kaohsiung (Taiwan's second-largest city) were obtained. The data collection technique employed was convenience sampling.	The analysis for this study followed the two-step methodology of Anderson and Gerbing (1988) and utilised structural equation modelling	(1) It shows that consumers' perceptions and attitudes towards green buildings significantly impact the intention to purchase, which subsequently influences WTP. (2) Other than having a direct impact on WTP, attitude also has an indirect influence through the mediating role of purchase intention.

Zhao & Chen (2021)	Exploring residents' purchase iIntention of green housing in China: An extended perspective of perceived value	This study investigates the influencing mechanism of residents' intention to purchase by integrating their perception and personal attributes into a comprehensive research model, which is based on an extended perspective of perceived value, GHs	Perceived benefits (including perceived functional benefits, perceived green benefits, perceived emotional benefits, and perceived social benefits), perceived value, perceived performance risks (including perceived financial risk and perceived performance risk), personal traits (including social trust, environmental concern, and GH purchase intention)	728 valid responses from residents in five cities in eastern China in this online survey.	PLS-SEM	(1) The results demonstrate that perceived values are one of the most important factors influencing WTP for green buildings. (2) Perceived performance risks have a negative impact on perceived value, whereas all aspects of perceived benefits, including social, emotional, functional, and green benefits have a favourable influence. (3) Perceived risks and benefits are highly influenced by two personality traits: Social trust and environmental concern.
Masukujjaman et al. (2022)	Green home buying intention of Malaysian millennials: An extension of the Theory of Planned Behaviour	The extended TPB model	ATT, SN, PBC, EC, green building knowledge, reasonable price, perceived value, environmental concern, green home purchasing intention	Information was gathered from 741 young Malaysian students who are prospective buyers. The quota sample technique was used to gather data.	Partial Least Squares (PLS) modelling (SmartPLS 3.0)	(1) The results demonstrate that green home buying intention is both significantly and positively affected by subjective norms, attitude, perceived behavioural control, reasonable pricing, perceived value, and knowledge of GBs, with attitude having the most impact. Environmental concerns are the only exception.

Chanda *et al.* (2023)	Modelling eco-friendly house purchasing intention: A combined study of PLS-SEM and fsQCA approaches	The extended TPB model	PBC, SN, ATT, Environmental knowledge, performance expectancy, willingness to pay, purchasing intention	The study uses the purposive sampling technique and quantitative research strategy to collect 386 data points.	The study employed a hybrid analysis strategy to determine the relevant elements, combining Partial Least Squares Structural Equation Modelling (PLS-SEM) and fuzzy-set Qualitative Comparative Analysis (fsQCA)	(1) The findings of the study demonstrate that attitude, subjective norms, environmental knowledge, performance expectancy, and environmental sensitivity favourably influence the intention to buy eco-friendly housing. (2) However, customers' intention to buy eco-friendly homes was found to be unaffected by WTP and perceived behavioural control.
(Dinh *et al.* (2022)	Predicting consumers' apartment purchase intention in Vietnam using an extended theory of planned behaviour	The extended Theory of Planned Behaviour (TPB)	Apartment features, project facilities, SN, perceived risk, PBC, financial factors, ATT, and purchase intention	512 responses to the questionnaire were obtained using the convenience sample technique.	The measurement and structural models were tested using covariance-based structural equation modelling	(1) The results indicate that perceived behavioural control is the most significant factor determining purchase intention, with financial variables, attitude toward a behaviour, subjective norms, and apartment features following closely behind. (2) Through attitude toward a behaviour, financial factors, perceived risk, project facilities, and apartment features indirectly influence purchase intention.

Author (Year)	Purpose	Variable	Details	Method	Findings
					(3) However, the relationship between perceived risk and project facilities with purchase intention is not statistically significant.
					(4) As a result, a consumer's attitude toward a behaviour is very important in influencing their intention to buy an apartment.
Zhang *et al.* (2021)	Promoting green real estate development by increasing residents' satisfaction	Residents' satisfaction/ WTP	The operation and maintenance of residential areas, building quality, indoor and outdoor comfort, public facility accessibility, and sustainable community attachment	In-person interviews with 614 Qingtangwan households served as the basis for this study.	The binary logistic regression model — (1) The mean Willingness To Pay (WTP) for residents was CHY 204.23 per month or around USD31.19. (2) Other than the bid value, a sense of community, indoor and outdoor comfort, building quality, and public facility accessibility are also related to residents' WTP.
Liu *et al.* (2019)	Promoting green residential buildings by increasing homebuyers' willingness to pay: Evidence from Sino-Singapore Tianjin Eco-city in China	Residents' satisfaction/ WTP	Architectural and construction quality, comfort and health, operation, maintenance and accessibility of GRBs, WTP for GRBs	Convenience sampling was employed to conduct an online survey among 511 GRB occupants, who now reside in the Sino-Singapore Tianjin Eco-city in China.	The latent class regression — (1) Different resident groups are affected differently by the four components of residential satisfaction. (2) The results demonstrate that health and comfort are common determinants of Willingness To Pay for all four residents. (3) While sociodemographic factors also have an impact on inhabitants' WTP, the energy efficiency of green residential buildings does not significantly affect WTP.

Author (Year)	Title	Theory/Model	Variables	Sample	Method	Findings
Zhang et al. (2019)	Proposing a value field model for predicting homebuyers' purchasing behaviour of Green residential buildings: A case study in China	The study offers a value field model based on psychology and physical field theories to assess the GRB purchase behaviour of homeowners	The original model had a distance (psychological distance), target charge (GRB demand), value field factor, and field source (green perceived value)	A total of 223 Nanjing, Jiangsu province, homebuyers completed legitimate online surveys.	SEM model	(1) The findings show that homebuyers' decisions to purchase GRBs are primarily influenced by psychological distance, followed by GRB demand and green perceived value. (2) The cognitive, spatial, and social distance has a detrimental impact on homebuyers' purchasing decisions in relation to GRBs, according to SEM results. (3) Eco-friendliness, energy conservation, environmental awareness, and environmental protection behaviour positively affect homebuyers' behaviour. (4) The three most important criteria encouraging homebuyers to adopt GRBs are perceived value of benefit, eco-friendliness, and cognitive distance.
Ren & Wang (2023)	Study on the factors affecting the green housing purchase Intention in urban residents—taking the Beijing-Tianjin-Hebei region as an example	The TPB theory	ATT, SN, PBC, green housing product attributes, environmental concern, purchase intention	A total of 325 valid surveys were acquired.	SEM analysis with AMOS 24.0	The findings show that subjective norms, environmental concerns, PBC, and green housing product features positively impact the purchasing intention of green housing. However, the influence paths and impacts of these factors on the GB purchase intention are distinct.

| He *et al.* (2023) | The influence of information on residents' green housing purchasing behaviour: Different information contents and providers | Providers and contents of the information | Demographical factors (gender, age, income), environmental protection attitude, information, information providers (government, other GHs householders, developers), and purchasing intention | 236 valid questionnaires were obtained. | The ordinal logistic regression | (1) Environmental protection attitude and consumers' age significantly impact their purchasing behaviour, while monthly income and gender have no significant influence. (2) Information on indoor air quality and the economy has a greater impact on consumers. The following is the order of influence: Luminous environment, greening rate, acoustic environment, thermal comfort, carbon emission reduction, investment benefit, waste classification, indoor air quality, cost saving in the usage phase, and information on loans at concessionary rates. (3) Consumers who possess higher environmental awareness are more concerned with carbon emissions and the living environment while economic benefits more influence those who possess low awareness. (4) Information from the government mostly affects consumers, but information from developers has comparatively less impact. |

Author (Year)	Title	Theory	Variables	Sample	Method	Findings
Nguyen et al. (2023)	Value activation to increase consumers' intention to purchase green apartments	Self-transcendence and self-enhancement values	Self-enhancement value, pro-environmental action-related content exposure, self-transcendence value, environmental problem-related content exposure, green apartment purchase intention	234 tenants of three high-rise buildings in Hanoi, Vietnam, participated in the survey.	Hierarchical Ordinal Least Squares regression (OLS) / Confirmatory Factor Analysis (CFA)	(1) The study's findings indicate a strong positive correlation between consumers' intentions to buy green apartments and their sense of self-transcendence. (2) However, it was discovered that exposure to content about environmental problems diminished the impact of self-transcendence value on green housing purchase intention, whereas exposure to content about pro-environmental action was found to increase the effect.
Durdyev et al. (2022)	What drives clients to purchase green buildings?: The cybernetic fuzzy analytic hierarchy process approach	/	Client's attitude toward purchasing GRBs, client's environmental awareness, client's behavioural control, government incentives, client's environmental concern	59 selected experts received questionnaires.	The study uses the Cybernetic Fuzzy Analytic Hierarchy Process (CFAHP) and the Interval-Valued Fuzzy Delphi Method (IVFDM)	Homebuyers have a good understanding of the benefits associated with GRBs. However, despite this awareness, these benefits alone are not strong enough to outweigh the perceived high cost of implementing green practices. Therefore, it is evident that the primary driving force behind homebuyers' actions is financial issues because they continue to look for financial incentives.
Al Mamun et al. (2023)	Willingness to pay premium prices for green buildings: Evidence from an emerging economy	VBN theory and TPB theory	Environmental beliefs, environmental literacy, incentives for green building buyers, awareness of consequences, ascription of responsibility, PBC, WTP for GBs	1,198 valid online questionnaires were collected.	The Structural Equation Modelling Partial Least Squares method (SEM-PLS)	(1) The results show that environmental literacy affects awareness of consequences and environmental beliefs among Malaysian working people. (2) Incentives for green building buyers greatly influence perceived behavioural control while awareness of consequences is a significant factor in the ascription of responsibility.

						Findings
						(3) Awareness of consequences does not affect clients' WTP for green buildings. (4) PBC and AR (the Ascription of Responsibility) have a significant influence on WTP for GBs.
Ofek & Portnov (2020)	Differential effect of knowledge on stakeholders' willingness to pay green building price premium: Implications for cleaner production	Knowledge of GB benefits	Knowledge of GB benefits (economic and health concerns, environmental concerns, and the expected maintenance savings)	The study, which was conducted in Israel in 2016, included 50 architects, 50 building contractors (developers), who participated in telephone interviews, and 438 prospective homeowners, who participated in an online survey.	Multivariate regressions	(1) The study shows that a healthier living environment and consumers' knowledge of expected annual savings are strongly linked to their WTP for the green building purchase price. (2) There is no clear correlation between architects' and developers' WTA GB PP and their understanding of certain GB advantages. (3) The study shows that an increased understanding of GB features and attributes does not always translate into increased willingness among various stakeholder groups to pay higher prices for GB products.
Kumah et al. (2022)	Examining built environment professionals' willingness to pay for green buildings in Ghana	/	Perceived value, perceived risk, perceived benefit, social trust, and environmental concern	A total of 153 online surveys from building energy professionals were obtained through the use of snowball and purposeful sampling strategies.	The analytical tools used by SPSS	(1) The study findings indicate that perceived benefit is the primary factor considered by building energy professionals in WTP for GBs. (2) The results demonstrate that building energy professionals take into account all factors when determining their WTP for GBs.

Author (Year)	Title	Theory / Model	Variables	Sample / Method	Analysis	Findings
Abed-Elgani *et al.* (2024)	Factors affecting the willingness of Arab residents in israel to pay for green buildings: results of a survey among potential homebuyers in Acre and Nazareth	/	Familiarity with the GB concept and benefits, government incentives, environmental awareness and knowledge, environmental concerns, and socio-demographic characteristics	A face-to-face survey conducted in two Israeli cities among 215 prospective Arab homeowners.	(1) Descriptive statistics (2) t-test (3) A multivariate regression analysis (4) Orthogonal variables for regression analysis are extracted using factor analysis	(1) Findings reveal that despite having lower familiarity with the attributes and concept of green buildings, Arab buyers are willing to pay a much higher price for a green apartment (10.56% compared to 6.58%). (2) The study shows a strong positive correlation between economic and environmental values and the acceptable size of green buildings' purchase price. (3) Societal values demonstrate a strong positive correlation with the acceptable size of the purchase price.
Liu *et al.* (2019)	Promoting green residential buildings in China: Bridging the gap between design and operation to Improve occupants' residential satisfaction	Perceived usefulness (Davis' Technology Acceptance Model)	Social trust, perceived usefulness, subjective knowledge, environmental attitude, residential satisfaction, repurchase intention	The 630 online surveys were conducted among adult residents.	Structural Equation Modelling	(1) Residents' knowledge about green residential buildings, perceived usefulness of GRBs, and environmental attitudes have an impact on their repurchase intentions. (2) Trust in institutions is not vital in shaping these intentions. (3) The presence of residential satisfaction acts as a moderating factor in predicting their intentions to repurchase.

Ho et al. (2024)	Raising the demand for residential green buildings: A general consumer behaviour model, the evidence, and the strategies	The Theory of Planned Behaviour (TPB), the Value-Belief-Norm model (VBN), and the Motivation-Ability-Opportunity	Environmental morality motivation (environmental awareness), economic ability and motivation (including purchasing power-income level and age and private benefit), and socio-psychological motivation (honour and trend)	1,185 online questionnaires were gathered from Taiwan and 316 valid online questionnaires from Mozambique by online sampling.	The Ordinary Least Squares (OLS) regression analysis	The study results indicate that consumers' purchase intention toward green buildings is significantly influenced by their environmental morality motivation, sociological and psychological motivation, and economic ability and motivation. Moreover, the proposed model exhibits generality and can be applied to other countries.
Golbazi et al. (2020)	Willingness to pay for green buildings: A survey on students' perception in higher education	/	NEC	1,040 complete online survey responses.	/	Significantly higher WTP for GBs was shown by students, who reported having a high level of knowledge about environmental concerns.
Khan et al. (2020)	Are Pakistani homebuyers ready to adopt sustainable housing? An insight into their willingness to pay	/	Demographical factors (gender, age, education, income), environmental knowledge, environmental attitude	354 potential buyers from Pakistan.	Using the hierarchical Bayesian model of adaptive choice-based conjoint analysis	According to the findings, environmental knowledge level and income have a negative correlation with WTP while age, gender, and literacy level have a positive correlation. Additionally, out of all the attributes of a home, energy savings are the most important.

The Systematic Literature Search Methodology

The data collection methods of this review paper were based on systematic reviews according to PRISMA (Moher *et al*., 2010). The PRISMA 2020 (Page *et al*., 2021) statement is an update of guidelines for preferred reporting in systematic reviews, originally published in 2009. Widely applicable beyond medical research, PRISMA enhances reporting quality in various research fields (Moher *et al*., 2010). Several researchers have adopted these guidelines to report reviews on consumer behaviour (Fleith De Medeiros *et al*., 2022; Ghazali *et al*., 2023; Limbu & Ahamed, 2023). The review process included article identification, duplicate screening, eligibility assessment, and the inclusion and exclusion of articles detailed in the next section.

The study began with a literature search in February 2024, which aimed to gather relevant articles. This search was conducted using two highly regarded electronic databases, Web of Science and Scopus. An advanced search string, "ALL=(green building or green housing) AND ALL=(intentions to pay or willingness to pay)" was applied to these databases, covering publications from 2019 to 2024. The authors aim to shed light on the psychological, environmental, and demographic factors that influence consumers' WTP for GBs. Before conducting a literature search, the authors developed inclusion and exclusion criteria to guide the selection of relevant articles from a wide range of databases. These criteria were borrowed from Wee *et al*. (2021) to determine eligibility for papers included in this review.

The Inclusion Criteria (ICs) for this review were as follows:

ICI : Full papers (complete conference papers included) that are published within the last five years (2019-2024).

IC2 : Written in the English language.

IC3 : Focused on consumption behaviours related to green buildings/green housing.

IC4 : Articles focused solely on the factors influencing residents' consumption behaviours in green buildings.

IC5 : Articles examining green building consumption from the perspectives of residents explicitly analysed such factors as psychological variables, contextual influences, demographic/personal factors, and consumer behaviour regarding green building intentions.

Any papers matching the following exclusion criteria were not included in the review:

EC1 : Papers that were published before 2019.

EC2 : Papers that were not written in the English language.

EC3 : Unpublished papers, textbooks, or dissertations (master's, doctoral).

EC4 : Not related to green buildings.

EC5 : Mentioned green buildings, but not as part of the primary research focus.

EC6 : Only utilise qualitative methods.

In addition, duplicate studies that were found in both the Web of Science and Scopus databases were removed from the dataset. The papers obtained from the electronic databases using the specific search terms went through several stages of evaluation for eligibility according to the PRISMA framework to determine whether they could be included in this review.

The paper employed content analysis to examine the eligible articles. Content analysis is a well-established qualitative analysis technique useful for examining textual data (Hsieh & Shannon, 2005). It allows for the organisation and condensation of extensive written material into clear key findings relevant to the research questions (Erlingsson & Brysiewicz, 2017).

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│   Language screening     │ - - - - - ►  │       Exclude: 14        │
│ (N = 1,217 → 1,177)      │              │ Reason: Application of the│
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│   Duplicates screening   │ - - - - - ►  │       Exclude: 40        │
│ (N = 1,177 → 1,137)      │              │   Reason: Duplicates     │
└─────────────────────────┘              └─────────────────────────┘
            │                                        │
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┌─────────────────────────┐              ┌─────────────────────────┐
│  Keywords and abstract   │ - - - - - ►  │       Exclude: 967       │
│        screening         │              │ Reason: Application of   │
│  (N = 1,137 → 170)       │              │     criteria EC3, EC4    │
└─────────────────────────┘              └─────────────────────────┘
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│ Abstract and full text   │ - - - - - ►  │       Exclude: 122       │
│       screening          │              │ Reason: Application of   │
│   (N = 170 → 48)         │              │    criteria EC4, EC5     │
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│  Full text assessment for│ - - - - - ►  │ Full text assessment for │
│       eligibility        │              │       eligibility        │
│   (N = 48 → 27)          │              │    (N = 48 → 27)         │
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│ Final set of articles    │
│   included for review    │
│      (N = 27)            │
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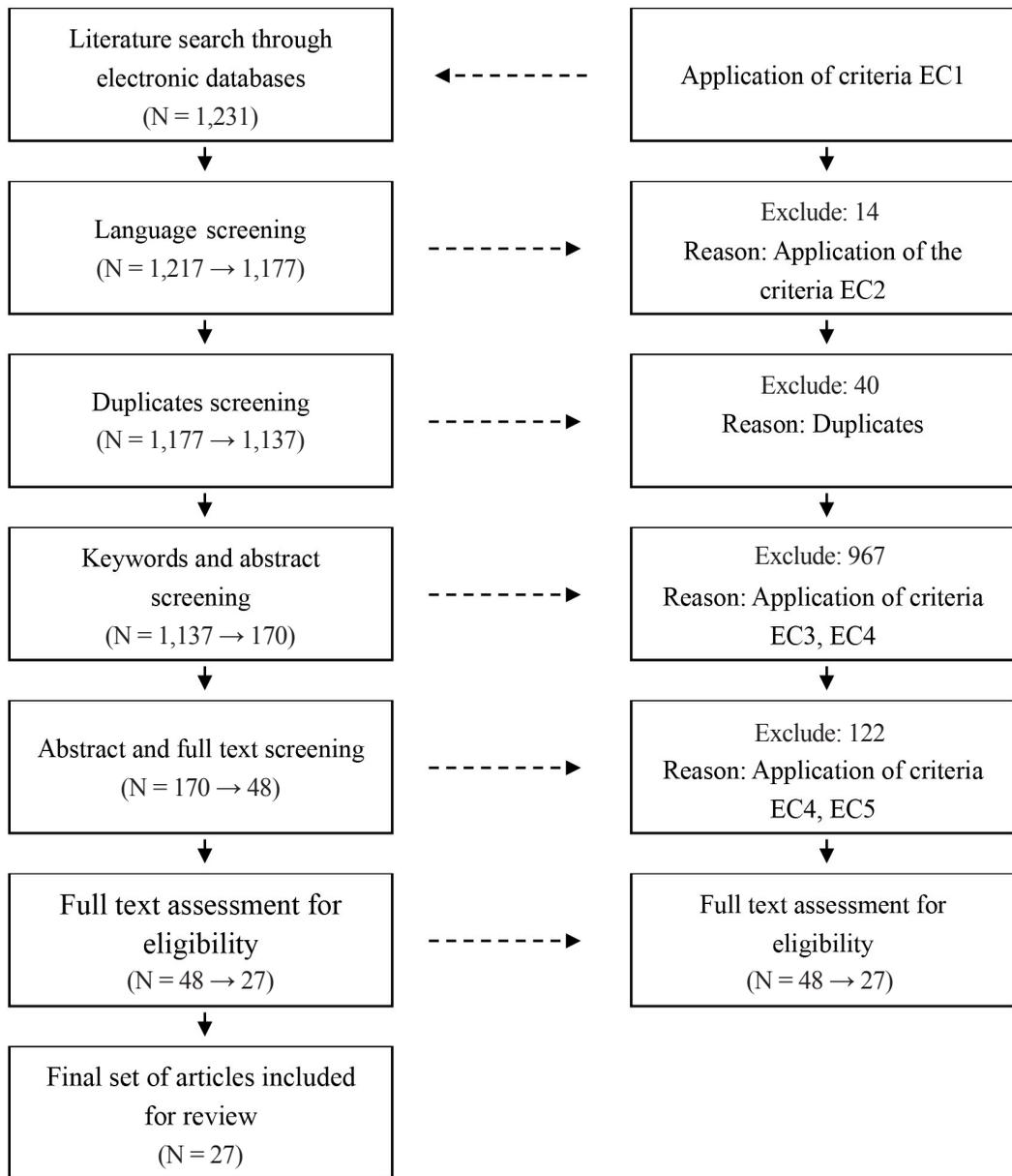
Figure 1: PRISMA framework

In this paper, content analysis was carried out independently by two authors familiar with this method. Any discrepancies in their findings were resolved through discussion. From the 27 selected papers listed in Table 1, the content analysis identified a range of psychological, contextual, and demographic factors potentially influencing consumers' WTP for green buildings, as summarised in Table 2. The table illustrates the content analysis process used to derive the findings. The initial analysis, consisting of a condensation process, of the 27 included articles identified 75 data points across three categories.

Due to overlapping issues among these data points, further analysis grouped them into relevant codes based on similarities. Data points that had comparable implementation concepts were given the same code. For example, "attitude, attitude toward green building housing products, attitude toward the eco-friendly house, attitude toward a behaviour, purchasing attitude, client's attitude toward purchasing GB" were coded as attitude. The psychological factors were organised into 13 codes: (i) Subjective Norm (SN), (ii) Attitude (ATT), (iii) Perceived Behavioural Control (PBC), (iv) Value, (v) Environmental Concern (EC), (vi) Awareness of Consequences (AC), (vii) Ascription of Responsibility (AR), (viii) Personal Norm (PN), (ix) Psychological Distance, (x) Social Trust, (xi) Knowledge, (xii) Perceived Value, and (xiii) Residents' Satisfaction. Contextual factors were categorised into two codes: (i) incentives from the government and (ii) financial factors. Demographic factors were grouped into seven

Table 2: Content analysis identified psychological, contextual, and demographic factors

Condensation		
Attitude	Honour/trend	Reasonable price
Attitude toward green building housing products	Green consumer identity	Self-transcendence
Attitude toward an eco-friendly house	Encouragement of people around the client	Self-enhancement
Attitude toward behaviour	Awareness and knowledge	Option-framing effect
Purchasing attitude	Perception toward green buildings	Value
Client's attitude toward purchasing GB	Green building knowledge	Perceived value
NEC	Behavioural control and the client's awareness	Perceived usefulness
Environmental attitude	Familiarity with the concept and benefits of GB	Perceived benefits
Environmental protection attitude	Subjective knowledge	Knowledge of GB benefits
Subjective norm	Environmental awareness	Private benefit
Client's environment	Environmental awareness	Perceived sacrifices
PBC	Environmental knowledge	Perceived risk
Personal norm	Self-report knowledge of environmental issues	Social trusts
Awareness of consequences	Psychological distance	Residential satisfaction
Ascription of responsibility	Motivation	House number
Environmental concern	Motivation/environmental morality, economic ability and motivation, Socio-psychological motivation	House price
Environmental sensitivity	GRB demand	Gender
Incentives for green building buyers	Government incentives	Age
Marketing and promotion	Indoor and outdoor comfort	Education
Comfort and health	Sense a sustainable community	Marriage

Green building product attributes	Building quality	Size (population)
Accessibility	Architectural and construction quality	Income
Operation	Public facility accessibility	Rural (rural/urban)
Operation and maintenance	Performance expectancy	Project facilities

↓

Code

Attitude	Honour/trend	Reasonable price
Attitude toward green building housing products	Green consumer identity	Self-enhancement
Attitude toward an eco-friendly house	Encouragement of people around the client	Option-framing effect
Attitude toward a behaviour	Awareness and knowledge	Self-transcendence
Purchasing attitude	Perception toward green buildings	Value
Client's attitude toward purchasing GB	Green building knowledge	Perceived value
NEC	Behavioural control and the client's awareness	Perceived usefulness
Environmental attitude	Familiarity with the concept and benefits of GB	Perceived benefits
Environmental protection attitude	Subjective knowledge	Knowledge of GB benefits
Subjective norm	Environmental awareness	Private benefit
Client's environment	Environmental awareness	Perceived sacrifices

↓

Code

Psychological Factors	Contextual Factors	Demographical Factors
Attitude (ATT)	Incentives from the government	Gender
Subjective Norm (SN)	Financial factors	Age
Perceived Behavioural Control (PBC)		Education
Environmental Concern (EC)		Marriage status
Value		Population
Awareness of Consequences (AC)		Income level
Ascription of Responsibility (AR)		Rural/urban residence
Personal Norm (PN)		
Psychological distance		
Social trust		
Knowledge		
Perceived value		
Residents' satisfaction		

codes: (i) age, (ii) gender, (iii) education, (iv) population, (v) marital status, (vi) income level, and (vii) rural/urban residence.

The review methodology, which adhered strictly to the PRISMA guidelines is illustrated substantially in Figure 1. A full set of 1,231 articles was uncovered from comprehensive searches of the Web of Science and Scopus indexes using the specified search parameters within the transformative timeframe of 2019 through 2024. Eligibility was weighed substantially according to predetermined inclusion and exclusion criteria.

Initially, language screening was conducted on the 1,177 articles traced from the databases, resulting in the exclusion of 14 articles not published in English. Duplicate screening further eliminated 40 articles, leaving 1,137 non-duplicated articles for eligibility assessment. These articles underwent a preliminary screening of keywords and abstracts to identify unfit articles based on the inclusion and exclusion criteria previously defined. This process removed 964 articles. The remaining 170 articles underwent a secondary screening involving both abstract and full-text evaluation to confirm their relevance to the study's objectives. Applying criteria EC4 and EC5 resulted in 122 articles being excluded. As a result, 48 articles advanced to thorough full-text evaluation to determine their ultimate eligibility for inclusion in this review. Each article was meticulously evaluated multiple times to ensure a comprehensive understanding and confirmation of its content, resulting in 27 articles being deemed eligible for inclusion.

Table 1 provides a detailed review of the eligible articles. Each article was reviewed and analysed based on the inclusion criteria and research questions. The review outcomes, presented in Table 1, include information on the authors, titles, theoretical models, psychological/demographic factors/contextual variables, sample sizes, data collection methods, data analysis techniques, and research findings from all 27 eligible articles. Table 1 offers a detailed analysis of the relevant literature. Every article was evaluated and analysed based on

research questions and the inclusion criteria for this study. The outcomes of the review, shown in Table 1, contain details regarding the authors, titles, theoretical models used, demographic/psychological/contextual factors explored, sample sizes and data collection approaches, data analysis methods, and key findings from each eligible study.

Discussion

The results of this study are categorised into three distinct subsections, each addressing a specific research question. The discussions are presented as follows.

The Role of Psychological Factors Affecting the Consumers' WTP for GBs

Previous studies have adapted the original theoretical models, including the Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM), and Value-Belief-Norm (VBN) theory, by adding additional psychological factors to improve the explanatory power of models. It is significant to investigate these psychological factors more closely to identify those that significantly impact the intention to purchase green buildings. From an extensive literature review, 13 potential psychological determinants have been identified and will be detailed in the next section. Table 3 presents a summary of the major conclusions regarding these psychological factors and their influence on consumers' intentions to make purchases.

Attitude (ATT), Subjective Norm (SN), and Perceived Behavioural Control (PBC) from TPB Theory

Attitude is widely accepted among scholars as the seminal psychological driver moulding a person's resolve to indulge in a given action. Per the widely hailed Theory of Planned Behaviour (TPB), attitude constitutes an individual's internal appraisal of the behaviour under scrutiny, as fundamentally formulated by Ajzen (1991). Within the TPB framework, attitude looms paramount in presaging behavioural intention,

Table 3: Findings of the psychological factors relevant to willingness to pay for green buildings

Psychological Variables	Findings in General	Expected Findings Based on Green Buildings
Attitudes (ATT)	• According to the study's findings, the next most important factor was people's attitudes toward buying green buildings (Durdyev & Tokbolat, 2022). • The study's findings indicate that behavioural-cognitive factors, particularly "attitudes regarding behaviour" and "behaviour driven by environmental awareness" were statistically significant in connection with WTP for green housing (Rosner *et al.*, 2022). • According to Huang (2023), consumers' attitudes and perceptions of green building housing items influence their intention to buy, buying intention influences willingness to pay. • According to Masukujjaman *et al.* (2022), attitude has the biggest impact on purchasing intention for greenhouses. • According to Zahan (2020), attitude is an important factor in green purchase intention and plays a crucial role in promoting green purchase behaviour. • According to Chanda *et al.* (2023), the PLS-SEM analysis indicated that attitudes have a significant impact on WTP for eco-friendly homes. • Dinh *et al.* (2022) found that attitudes abt a behaviour were the main determinants of purchasing intention. • According to Ren and Wang (2023), the notion that a favourable purchase attitude influences purchase intention is unfounded. • According to Judge *et al.* (2019), attitudes play a substantial role in predicting purchasing intentions. • Survey respondents reveal that attitude is a significant factor in predicting purchasing intentions (Durdyev *et al.*, 2022).	On the basis of research findings, attitude positively affects WTP for GRBs.
Subjective Norm (SN)	• Durdyev and Tokbolat (2022) infer that the encouragement of people around the client is a vital feature of green purchase intention and has a significant role in green building purchase behaviour. • The findings show that subjective norms significantly and positively impacted the intention to buy a green home (Masukujjaman *et al.*, 2022). • The empirical findings suggest that consumers' intentions to purchase green goods from GH in Bangladesh are not directly impacted by subjective norms (Zahan, 2020). • Subjective norms have a beneficial impact on the intention to purchase an eco-friendly home, according to Chanda *et al.* (2023).	Based on research findings, it can be deduced that a subjective norm positively affects WTP for GRBs.

Subjective Norm (SN)	• According to Dinh *et al.* (2022), subjective norms have a big impact on consumers' intentions to buy. • According to Ren and Wang (2023), SN positively influences urban dwellers' intentions to acquire green homes in the Beijing, Tianjin, and Hebei regions.	
Perceived Behavioural Control (PBC)	• The research findings indicate that buying intention was positively impacted by PBC (Durdyev & Tokbolat, 2022). • According to Rosner *et al.* (2022), there was no correlation between the level of preparation assessed and "perceived control of behaviour". • The findings suggest that green home purchase intentions are significantly and positively impacted by perceived behavioural control (Masukujjaman *et al.*, 2022). • According to Zahan's (2020), research findings, purchasing behaviour is significantly influenced by PBC. • According to Sang (2020), PBC has a direct impact on consumers' WTP for GRBs. • According to Chanda *et al.* (2023), PBC positively impacted consumers' intentions to purchase green homes. • The results indicated that perceived behavioural control was the most important factor determining purchase intention (Dinh *et al.*, 2022). • According to Ren and Wang (2023), PBC has a favourable impact on urban inhabitants' intentions to purchase green homes in the Beijing-Tianjin-Hebei region. • Judge *et al.* (2019) found that PBC was a strong predictor of purchase intentions. • Al Mamun *et al.* (2023) found that WTP for GBs is significantly influenced by perceived behavioural control.	On the basis of research findings, it can be deduced that perceived behavioural control positively affects WTP for GRBs.
Environmental Concern (EC)	• The findings indicate that the "client's attitude toward purchasing GB" is most influenced by the "Client's Environmental Concern" (CEC). CECs are beneficial factors that influence purchasing intention as well (Durdyev & Tokbolat, 2022). • According to Masukujjaman *et al.* (2022), Malaysians' intentions to purchase green homes are unaffected by the EC. • According to the study, customers' intentions to purchase GRBs in Bangladesh are not influenced directly by environmental concerns (Zahan, 2020). • Environmental sensitivity was found to positively influence the intention to purchase GRBs, according to Chanda *et al.* (2023). • According to Ren and Wang (2023), EC has a favourable effect on urban inhabitants' intentions to acquire green homes in the Beijing, Tianjin, and Hebei regions. • The findings show the strong influence of their attitude toward environmental protection on their purchasing behaviour (He *et al.*, 2023).	On the basis of research findings, it is proposed that environmental concern has a positive effect on the WTP for GRBs.

Environmental Concern (EC)	• Homebuyers' intention to purchase GB is significantly motivated by environmental concerns, according to research by Durdyev *et al.* (2022).
	• The findings indicated that BE professionals were more inclined than EC to pay for GRBs (Kumah *et al.*, 2022).
	• Liu *et al.* (2019) demonstrated that residents' environmental attitudes were a critical determinant of repurchase intentions.

with study subjects embracing sunnier outlooks toward a behaviour more predisposed to engage in said behaviour (Ajzen, 2002). Numerous studies have investigated consumer intentions to purchase green buildings, consistently showing that attitudes are a crucial determinant in the intention to buy green buildings. This significant influence is supported by the research of Judge *et al.* (2019), Zahan *et al.* (2020), Durdyev and Tokbolat (2022), Rosner *et al.* (2022), Masukujjaman *et al.* (2022), Dinh *et al.* (2022), Durdyev *et al.* (2022), Huang (2023), and Chanda *et al.* (2023). However, Ren and Wang (2023) provide a contrasting finding, indicating that the positive effect of purchasing attitude on purchasing intention is not supported in their study.

Subjective norms, according to TPB, encapsulate the social strictures that mould an individual's resolve to engage in a specific behaviour (Ajzen, 1991). Within the TPB framework, these norms serve as the quintessential barometer for quantifying the impact of social clout on behavioural intentions (Ajzen, 1991). Judge *et al.* (2019) describe subjective norms as encompassing an individual's beliefs about how important others view a particular behaviour and whether those others engage in the same behaviour. When individuals are uncertain about the results of a behaviour, they often need support from others (Bratt, 1999). For example, when purchasing a house, individuals frequently consider the requirements and preferences of family members or a spouse, highlighting the role of social pressure in decision-making.

However, the extent to which the popularity of sustainable housing influences purchase decisions is uncertain, partly due to the limited visibility of certifications in most residential properties. In the studies of green buildings, subjective norms have been shown to positively affect the intention of purchasing green buildings (Judge *et al.*, 2019; Durdyev & Tokbolat, 2022; Masukujjaman *et al.*, 2022; Dinh *et al.*, 2022; Chanda *et al.*, 2023; Ren & Wang, 2023).

Perceived Behavioural Control (PBC) designates an individual's subjective view of the simplicity or difficulty involved in carrying out a specific act (Ajzen, 1991). The inclusion of PBC into the theory of rational behaviour is due to the need to predict behaviour that is not entirely out of an individual's voluntary will (Ajzen, 1991). However, the dimensions of PBC have not been clearly outlined in existing research. Ajzen (2011) proposes dividing PBC into two components: Self-efficacy and control beliefs. Self-efficacy involves consumers' assessment of their ability to complete a purchasing task, focusing on internal control factors (Bandura, 1992).

Conversely, control beliefs relate to the perceived difficulty of the purchasing process, focusing on external and overarching factors. Empirical evidence shows that both self-efficacy and Perceived Behavioural Control (PBC) effectively predict behaviour (Armitage & Conner, 2001). Another perspective suggests that the perception of difficulty and the perception of control independently influence behavioural intentions (Kraft *et al.*, 2005). Including PBC significantly improves the accuracy of predicting behavioural intentions. Research findings indicate that PBC directly impacts consumers' willingness to purchase green buildings (Zahan *et al.*, 2020; Sang *et al.*, 2020; Durdyev &

Tokbolat, 2022; Masukujjaman *et al*., 2022; Dinh *et al*., 2022; Chanda *et al*., 2023; Ren & Wang, 2023; Al Mamun *et al*., 2023). However, Rosner *et al*. (2022) found that PBC was not correlated with the level of readiness that was examined.

Environmental Concern (EC)

Environmental concern has become established as a method for appraising perspectives on realities, acts, and others' conduct with ecological implications (Ajzen, 1988; Takala, 1991). Bamberg (2003) conceptualised environmental concern as the degree of individual focus granted to environmental matters and preparedness to enact solutions. From an individualised viewpoint, environmental concern commonly captures someone's all-encompassing stance toward the natural world (Fransson & Garling, 1999) and has proved pivotal in fostering pro-environmental behaviour (Wakefield *et al*., 2006). According to the Theory of Planned Behaviour (Ajzen, 1988; Ajzen, 1991) and the environment-friendly behaviour model (Hines *et al*., 1987), individual environmental protection behaviour is positively influenced by environmental concern, a critical internal factor at the personal level.

Additionally, including a measure of Environmental Concern (EC) enhances the predictive ability of the TPB (Donald *et al*., 2014). At the organisational level, widespread environmental concern among the public can influence the advancement of social environmental protection efforts. It has the power to shape the evolution and implementation of environmental policies (Poortinga *et al*., 2004). Fransson and Garling (1999) analysed worry on two levels: The negative impact of individual consumption patterns on the ecosystem and the perceived need for political, social, and judicial reforms to safeguard the environment. Various methods have been developed to assess environmental attitudes, such as the Environmental Attitude and Knowledge Scale (Maloney & Ward, 1973) and the New Ecological Paradigm (Dunlap & Liere, 1978). The new ecological paradigm was

later modified to improve reliability and validity (Dunlap *et al*., 2000) and has been widely used to assess the pro-environmental stance of groups or the public. Stern *et al*. (1999) integrate the new environmental paradigm into the value-belief-norm (VBN) theory. Research shows that environmental concerns can increase the intention to purchase green buildings (Liu *et al*., 2019; Kumah *et al*., 2022; Durdyev & Tokbolat, 2022; Durdyev *et al*., 2022; Chanda *et al*., 2023; Ren & Wang, 2023; He *et al*., 2023). However, studies by Masukujjaman *et al*. (2022) and Zahan *et al*. (2020) show that purchasing attitude does not significantly affect purchase intentions.

Value, Awareness of Consequences (AC), Ascription of Responsibility (AR), Personal Norm (PN) from the Values-Beliefs-Norms (VBN) theory

The theory of planned behaviour is widely used to predict a variety of behaviours but has been criticised for not including moral norms (Sia & Jose, 2019). To address this gap, the values-belief-norm theory has been proposed, which emphasises individuals' values and moral norms as key motivators. According to VBN theory, there is a causal relationship among five variables: Values, Personal Norms, Ascription of Responsibility, New Ecological Paradigm, and Awareness of the Consequences (Chen, 2015; Stern, 2000). In VBN, personal values first inform the ecological worldview, directly influencing one's awareness of consequences. This awareness triggers personal responsibility, activating personal norms in the process (Klockner, 2013; Han, 2015; Li *et al*., 2018b).

Awareness of consequences (AC) refers to being aware of negative effects on others or things valued due to a lack of prosocial behaviour, while ascription of responsibility (AR) refers to an individual's sense of responsibility for these negative outcomes. When AC is combined with responsibility, the likelihood of feeling a moral obligation (PN) increases. According to the study of Al Mamun *et al*. (2023), AC was not related to WTP of green buildings, while AR has a positive correlation with WTP.

The VBN theory states that values are generally classified as biospheric, altruistic, or egoistic. These three values directly influence an individual's ecological worldview (Klockner, 2013). Stern *et al*. (1999) examined the two foundational sources of environmental concern - altruism and self-interest - connecting them to Schwartz's dimensions of Self-Transcendence and Self-Enhancement. Durdyev *et al*. (2022) found that values centred around self-transcendence (altruism) positively influenced green home purchase intent while values focused on self-enhancement (egoism) did not.

Within the VBN chain model, Personal Norms (PN) designate an individual's feeling of duty to participate in or abstain from specific behaviours. PN represents the ultimate predictor of pro-environmental behaviour. Though studies conclusively showing PN's significant impact on willingness to buy green products are scarce, Sang *et al*. (2020) provided evidence substantiating the direct effect of personal norms on consumer willingness to purchase green residences.

Psychological Distance

The concept of "psychological distance" was introduced by Liberman and Trope in their 1988 study on social psychology. Bar-Anan *et al*. (2007) identified four types of psychological distance that can influence consumer decision-making, which are time, social, spatial, and hypothetical distance. These four sub-dimensions are highly correlated (Zhu, 2018). An analysis by Zhang *et al*. (2019) found that these dimensions have a negative impact on homebuyers' decisions to purchase green buildings.

Social Trust

Trust has been a major focus in social science research, and it has various definitions. Rousseau *et al*. (1998) give a widely accepted definition of trust, where others act positively even if there is risk. They believe that trust directly affects consumers' WTP. In the context of green consumption, the concept of green trust has also emerged. Ganesan (1994) defines trust as an emotion, expectation, or belief in the expertise, reliability, and intent of another party. Social trust refers to the people's confidence in institutions, which are responsible for public safety and health policy (Siegrist, 2000).

When social trust increases, people are more likely to accept new technologies. However, Kumah *et al*. (2022) point out that trust is the least important factor for built environment professionals in WTP for GRBs. In addition, Liu *et al*. (2019) found that social trust had no significant effect on repurchase intention.

Knowledge (Environmental Knowledge and Green Building Knowledge)

Environmental knowledge includes an understanding of the environment, ecosystems, and the interactions between various elements and is essential for making informed decisions (Fryxell & Lo, 2003). Studies by Lynchehaun (2002) and Taufique *et al*. (2016) show that environmental knowledge can significantly affect people's attention to environmental issues. Consumers who understand ecological issues are more inclined to buy green products (Mahesh, 2012; Wang *et al*., 2014). Conversely, when consumers are unaware of eco-friendly options, they are less likely to participate in pro-environmental activities (Hamzah & Tanwir, 2021).

Therefore, environmental knowledge is of great significance in terms of future consumption behaviour (Vermeir & Verbeke, 2006; Kautish & Sharma, 2020). Research by Golbazi *et al*. (2020), Rosner *et al*. (2022), Chanda *et al*. (2023), and Ho *et al*. (2024) found a strong link between environmentally conscious behaviours and green housing preferences. However, Zahan *et al*. (2020) observed that environmental knowledge does not directly affect the green purchase intention of Bangladeshi consumers. Khan *et al*. (2020) showed that environmental knowledge and income level are negatively correlated with WTP.

Green building knowledge includes an understanding of the facts, concepts, and procedures of green building (Cole, 2019). In consumer research, it is generally accepted that knowledge influences every stage of the decision-making process (Alshebami, 2021). When consumers recognise product benefits, they are willing to pay higher prices (Berger, 2019). Durdyev and Tokbolat (2022) believe that customer awareness and knowledge are the next most influential drivers of green building adoption. Studies by Masukujjaman *et al*. (2022), Huang (2023), and Abed-Elgani *et al*. (2024) confirm that green building knowledge has a positive impact on WTP for GBs. He *et al*. (2023) show that the likelihood of buying a green home increases 3.040 times with each additional information.

Liu *et al*. (2019) found that residents' knowledge of green housing is a key determinant of repurchase intention. Durdyev *et al*. (2022) demonstrate that customer awareness and behavioural control have a limited impact on WTP for green buildings. Ofek and Portnov (2020) found that consumers' awareness of potential yearly savings and a healthier living environment significantly influences their WTP for green building prices (GB PP). On the other hand, there is no discernible correlation between architects' and developers' WTA, GB, PP, and their understanding of particular GB benefits.

Perceived Value (Perceived Benefits and Perceived Sacrifice)

While many respondents agreed on quality indicators, their perceptions of value varied widely. The current study identified four distinct consumer definitions of value: (1) value as desired product features, (2) value as a low price, (3) value as the quality received for the price, and (4) value as the trade-off between what is received and given (Zeithaml, 1988). Specifically, the perceived value of Green Homes (GHs) is described as "the resident's perception of GHs according to their tradeoff between benefits and sacrifices" (Zhao & Chen, 2021). Research has consistently shown that a

higher perception of value usually leads to more positive purchase decisions (Wu, 2013).

Zeithaml (1988) divided consumer perceived value into two dimensions: Perceived benefit and perceived sacrifice. The benefit components include intrinsic attributes, perceived quality, extrinsic attributes, and other high-level abstractions. In the context of green buildings, perceived functional benefits encompass residents' views on the utilitarian, functional, and physical aspects of GRBs (Babin *et al*., 1994). These benefits stem from the instrumental attributes of green homes, primarily focusing on health, comfort, and economy. Researchers frequently highlight "perceived usefulness" as a crucial element of the functional value of GHs (Liu *et al*., 2018; Rajaee *et al*., 2019).

On the contrary, sacrifice elements of perceived value include both monetary and non-monetary costs (Zeithaml, 1988). Perceived risk involves consumers' perception of uncertainty and potential negative outcomes associated with specific activities (Dowling & Staelin, 1994). Zhao and Chen (2021) categorise perceived risk into financial risk and performance risk. Li *et al*. (2019) further categorise perceived sacrifice into economic risk, safety risk, functional risk, and policy risk.

Research by Zhao and Chen (2021) revealed that perceived value is a key determinant of green home purchase intention. They found that perceived benefits in all aspects (functional, emotional, environmental, and social) enhance perceived value while perceived performance risk decreases perceived value. Similarly, Masukujjaman *et al*. (2022) concluded that perceived value significantly influences the WTP for green homes. Zhang *et al*. (2019) proposed that the perceived value of benefits and costs constitutes the "green perceived value" scale, positively influencing WTP for GBs.

Kumah *et al*. (2022) found a positive correlation between perceived benefits and perceived value with the WTP for GBs, whereas perceived risk had a negative correlation.

They identified perceived benefit as the most significant factor influencing building professionals' WTP for GBs. Liu *et al*. (2019) showed that the perceived usefulness of green residential buildings is a stronger predictor of repeat purchase intention among satisfied residents compared to dissatisfied ones. Chanda *et al*. (2023) found a strong positive influence between expected performance and purchase intention. Ho *et al*. (2024) reported that the influence of perceived benefit is supported by data from Taiwan but not from Mozambique.

Residents' Satisfaction

Residential satisfaction serves as a crucial operational performance indicator of GBs. Studies have examined residents' satisfaction from various angles. Liu *et al*. (2019) divided over 20 indicators into four categories: Operations and maintenance, accessibility, construction and architectural quality, comfort, and health. These factors of WTP have varying impacts on different resident groups. Comfort and health are common determining factors for all groups. Zhang *et al*. (2021) adapted 30 satisfaction indices and identified five components: Building

quality, indoor and outdoor comfort, operation, the sense of sustainable community, and public facility accessibility. Their findings showed that satisfaction with indoor and outdoor comfort, sustainable community attachment, and public facility accessibility significantly influenced residents' WTP. Ren and Wang (2023) demonstrated that green housing product attributes positively impact purchase intention. Dinh *et al*. (2022) discovered that apartment features are an important indicator in determining purchase intention, although project facilities were not statistically correlated with WTP.

The Role of Contextual Factors Affecting the Consumers' Willingness to Pay for GBs

When examining green building buying intentions, various studies have taken into account nonpsychological factors. It is essential to study the contextual factors to reveal the potential influences on consumers' decisions. In the next sections, two background factors are identified from a literature review. Table 4 summarises the key findings related to these variables.

Table 4: Findings of the contextual factors relevant to WTP for GBs

Contextual Variables		Findings in General	Expected Findings Based on Green Buildings
Incentives from the government	▪	Governmental incentives are among the important ones, as demonstrated by Durdyev *et al*. (2022), suggesting that buying GB is a financially sound decision.	Based on research findings, it is proposed that incentives from the government have a positive effect on the WTP for GRBs.
	▪	As for government, Durdyev and Tokbolat (2022) showed that government incentives are one of the most crucial factors affecting the decision to buy a green home; these incentives include direct grants, soft loan incentives, and tax reductions.	
Financial factors	▪	Masukujjaman *et al*. (2022) demonstrated that reasonable pricing had a positive and vital effect on green home purchase intention.	On the basis of research findings, it is proposed that financial factors have a positive effect on the WTP for GRBs.
	▪	According to Dinh *et al*. (2022), affordable prices significantly and favourably influenced consumers' intentions to purchase green homes.	
	▪	According to Wu *et al*. (2022), homeowners are more prone to purchase a green home if housing prices are higher and they own more homes overall.	

Incentives from the Government

Government incentives have a positive impact on consumers' WTP for green buildings. These incentives such as tax breaks, subsidies, and favourable loan rates offer economic benefits. Consumers are also encouraged by long-term cost savings from energy and water efficiency, supported by government programs. Various studies have shown that government incentives are significant factors influencing the purchase of GBs (Durdyev *et al*., 2022; Durdyev & Tokbolat, 2022).

Financial Factors

Financial Factors (FF) encompass maximum mortgage, price, maximum monthly payment, interest rate, and payment duration (Adair *et al*., 1996; Opoku & Abdul-Muhmin, 2010; Le-Hoang *et al*., 2020). Financial factors related to credit access and relatively high loan interest rates (Xiao & Tan, 2007) are significant. Dinh *et al*. (2022) identified financial factors as crucial determinants of purchase intention. Reasonable pricing, as highlighted by Masukujjaman *et al*. (2022) refers to the price relative to the benefits (value) sought, not necessarily a lower price. They demonstrated that reasonable pricing had a positive and significant impact on GH purchase intentions. Wu *et al*. (2022) considered "house price" and "house number", showing that higher housing prices and more houses owned increased the willingness to purchase a greenhouse.

The Role of Demographical Factors Influencing the Consumers' WTP for GBs

Demographic factors significantly affect consumers' WTP for green buildings. Characteristics such as age, education, income level, gender, marital status, population, and rural or urban residence shape consumers' preferences and investment decisions regarding green buildings.

Research shows that gender generally does not have a statistically significant correlation with the willingness to choose sustainable housing (Zhang *et al*., 2021; Wu *et al*., 2022; Rosner *et al*., 2022; He *et al*., 2023). However, Khan *et al*. (2020) found a positive correlation between gender and WTP. While Zhang *et al*. (2021) and Rosner *et al*. (2022) found no significant link between age and WTP, other studies (Khan *et al*., 2020; He *et al*., 2023; Ho *et al*., 2024) reported a positive correlation. Education also plays a vital role, with higher education levels generally increasing awareness of environmental issues and the benefits of sustainable practices. Khan *et al*. (2020) and Wu *et al*. (2022) have shown a positive relationship between education and WTP for green buildings. Marital status influences WTP as well, with higher education and being unmarried associated with a stronger willingness to buy green homes.

Income level is another crucial determinant. Wu *et al*. (2022) and Ho *et al*. (2024) found that higher income levels correlate with a stronger WTP for green buildings, as individuals or households with higher incomes have more disposable income to allocate towards sustainable housing. They also tend to recognise the long-term cost savings of energy-efficient features and sustainable practices. Conversely, Khan *et al*. (2020) showed a negative correlation between WTP and income level while Zhang *et al*. (2021), Rosner *et al*. (2022), and He *et al*. (2023) found no significant relationship. Additionally, rural versus urban residence affects WTP for GBs, with Wu *et al*. (2022) indicating that households in rural areas are more likely to purchase green homes compared to those in urban regions.

Conclusions

Green buildings are crucial for lowering global energy consumption and enhancing the environmental sustainability of structures. This paper thoroughly reviews the factors influencing residents' WTP for green buildings, covering psychological, contextual, and demographic aspects. The motivation for the paper arises from the widespread use of conventional building techniques in emerging economies, largely due to insufficient public awareness of sustainable building practices and ineffective

communication strategies. By exploring the research on green building consumption, the paper examines various theoretical models.

The authors conducted a detailed analysis of factors influencing green building consumption, focusing on contextual, psychological, and demographic elements. From an initial pool of over 1,231 articles published in the last five years, they selected 27 articles for in-depth analysis. Notably, the number of publications in this field has surged since 2019. To enhance the validity and reliability of their findings, the authors employed a systematic content analysis method. This analysis uncovered that psychological factors like psychological distance, social trust, perceived value, and satisfaction have been inadequately explored in previous research. The review revealed that consumers with a good understanding of GBs' benefits are willing to pay approximately 10% more for ecological building price premiums (Ofek & Portnov, 2020). Khan *et al.* (2020) reported an average willingness to pay of 11.07%, with features like "Energy saving 40%" positively influencing this willingness. Liu *et al.* (2019) observed that residents motivated by the comfort and health benefits of green housing are willing to pay 12,575 CNY/m².

On the other hand, Judge *et al.* (2019) found that consumers are less inclined to pay a 12.5% higher price for sustainable housing if the green building technology takes more than two years to pay off. The paper also discusses the impact of government incentives, including direct grants, tax reductions, and soft loan incentives, alongside financial factors like reasonable pricing, house price, and house number. Policy recommendations include integrating psychological, environmental, and demographic factors to encourage public participation in green building projects and secure the sustainable development of GBs.

This study provides valuable insights for policymakers, real estate developers, and financial institutions, helping them more effectively promote green buildings. The findings indicate that psychological factors—such as attitude, subjective norms, perceived behavioural control, environmental concern, social trust, and so on—play a crucial role in consumers' willingness to pay. Therefore, targeted campaigns and guidance can be implemented to enhance public recognition and purchase intentions for green housing. At the same time, government incentives and financial considerations cannot be overlooked. Optimising subsidy policies and tax incentives can make green housing more financially attractive.

Additionally, demographic characteristics such as income level, education, and urban or rural residence, suggest that different groups have varying concerns about green buildings, necessitating differentiated marketing strategies. For instance, developers can emphasise the long-term energy-saving benefits and environmental value of green housing to environmentally conscious consumers while promoting financial subsidies and economic returns to price-sensitive buyers. By comprehensively addressing these factors, governments, businesses, and financial institutions can more effectively drive the development of green buildings, encouraging more consumers to invest in sustainable housing.

This paper identifies four potential future research avenues:

- Theoretical Frameworks: The review underscores the limited application of such theoretical frameworks as the Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), and Value-Belief-Norm (VBN) theory in green building consumption. This clearly indicates the need for further research in this area.

- Scope Expansion: While this study focuses exclusively on green buildings and sustainable housing, future research could expand to include zero-carbon buildings, smart buildings, low-carbon buildings, and advancements in building technologies. This broader scope would help address existing research gaps and provide a more comprehensive analysis.

- Diverse Population Groups: Further research is needed on various resident groups to identify the determinants influencing their purchasing intentions. Comparative studies across different populations, particularly considering cultural diversity in developing countries are also recommended.

- Stakeholder Roles: Exploring the roles of different stakeholders, including green building suppliers, construction firms, and designers, in the resident decision-making process holds considerable research potential. Understanding how stakeholders can guide residents through their purchase decisions and gather feedback post-purchase is crucial.

The authors stress that residents are crucial in advancing green buildings in society. Among all stakeholders, residents hold the most influence by demanding and using sustainable products (Darko *et al*., 2019). Without robust market demand, green building technology initiatives will fail. Thus, resident-focused policies should be crafted, considering residents' concerns, perceptions, and sociological, demographic, psychological, and contextual behavioural factors to boost development in the building sector.

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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