



# Willingness to pay premium prices for green buildings: evidence from an emerging economy

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## Abstract

The building sector is one of the major contributors to greenhouse gas (GHG) emissions, which may impede the achievement of Malaysia's intended nationally determined contribution (INDC) by 2030. Therefore, this paper is aimed at identifying the underlying factors that affect working adults' willingness to pay (WTP) premium prices for green buildings. Data were collected from a total of 1198 respondents and analyzed using structural equation modeling partial least square (SEM-PLS) to measure the willingness to pay for green buildings among working adults in Malaysia. The findings reveal that environmental literacy affects environmental belief as well as awareness of consequences among working adults in Malaysia. The findings also reveal that incentives for green building buyers have a significant impact on perceived behavioral control, while awareness of consequences has a significant influence on ascription of responsibility. However, the results reveal that awareness of consequences does not influence buyers' willingness to pay for green buildings. Moreover, the ascription of responsibility and perceived behavioral control have a significant effect on willingness to pay for green buildings. The findings of this study will help the concerned authorities to take appropriate steps to promote willingness to pay for green buildings, which will contribute significantly to the realization of INDC by 2030 as part of the Paris Agreement.

**Keywords** Willingness to pay · Green building · Working adults · Malaysia

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## Introduction

Malaysia is making continued efforts to reduce its carbon footprint, which includes a commitment to reducing its carbon emission by 40% in 2020 and 45% in 2030. It is also facing the challenge of decarbonizing its energy-driven economy in the face of population growth and high levels of poverty (Susskind et al. 2020). In accordance with this target, the government has put forth several initiatives to achieve the intended nationally determined contribution (INDC) that forms part of the Paris Agreement. Throughout these initiatives, it was discovered that the building sector is one of the main contributors of greenhouse gas (GHG) emissions, as it makes up approximately 40% of the world's energy consumption, 12% of its water, and 40% of the waste that is sent to landfills (Amaral et al. 2020). Given this information, this sector could threaten Malaysia's achievement of the INDC. Therefore, there is an urgent need for Malaysia to pay attention to the construction of energy efficient and zero emission buildings for sustainable and pollution free cities.

The development of sustainable construction is built upon the principles of green building. The economy is

undoubtedly impacted by the construction industry, which generates a large portion of the gross domestic product. Although green buildings have numerous positive effects on society, there are numerous market hurdles that prevent the growth of green buildings, particularly in Malaysia (Samari et al. 2013). Green buildings may bring multiple benefits (Portnov et al. 2018a, b; Ampratwum et al. 2021) to working adults in Malaysia. However, the lack of environmental literacy, environmental belief, incentives for green building buyers, or any uncertainty about these benefits, combined with a nominal price premium for green buildings, may prevent potential working adults from entering the green building market. As a result, government incentives might be required.

There are several market hurdles that prevent the growth of green buildings in Malaysia (Kamranfar et al. 2022), including lack of awareness and understanding, high initial cost, limited financing options, regulatory barriers, and limited market demand (Addy et al. 2021). Many people in Malaysia are not familiar with the concept of green buildings and do not understand the benefits of sustainable construction practices. From the perspective of Malaysian working adults, the issue with the willingness to pay premium prices for green buildings is closely related to the high initial cost hurdle (Manzoor et al. 2021). Many working adults may not be willing or able to pay a premium price for a green building, even if they understand the long-term benefits of sustainable features. Additionally, limited financial options, green environmental literacy, and ascription of responsibility may also make it difficult for working adults to invest in a green building, as they may not have access to the necessary financing options and knowledge of green building information. In the context of Malaysia, the previous studies mostly focused on the adoption of green office building development (Ohuero et al. 2020), and green construction development barriers as well as strategies for adopting green building information (Kamranfar et al. 2022; Manzoor et al. 2021). Therefore, this study is to examine the determinants of the ascription of responsibility, awareness of consequences, and perceived behavioral control of prospective working adults in Malaysia who are willing to pay premium prices for green buildings.

Green buildings preserve natural resources and improve the quality of life of human beings, while also playing a crucial role in achieving sustainability in the construction industry (Hemmati et al. 2022). Darko et al. (2019) reported that the construction industry has made efforts to improve green building practices over the past two decades in order to improve the quality of indoor environments. Environmental issues such as the energy crisis, climate change, and pollution growth are gaining attention around the world. Transforming how buildings are constructed is growing more urgent as its impact on the environment is likely to increase

with population growth and changes in economic and demographic factors. Aghili et al. (2019) reported that buildings are the top 40–50% greenhouse gas producers globally. Similarly, the green building revolution has grown to reduce the negative effect on people and simultaneously support the environment and the propensity to increase opportunities that reinforce positive benefits (Allen et al. 2015).

The green building sector's investments in energy-efficient measures can maintain both ecological and economic benefits by reducing their consumption of waste, water, and energy. For instance, green buildings can create high standard environmental quality indoors (Steinemann et al. 2017; Sant'Anna et al. 2018), which may increase employee productivity, improve health conditions, and develop working environments (Wiencke 2014). Thus, sustainable business behavior is a necessary part of Malaysia's carbon reduction goal. As such, investment in green practices (Chen et al. 2022), structures, and institutional guidelines is required. This study is aimed at investigating the environmental literacy, belief, incentives, responsibility, awareness of consequences, and the perceived behavioral control that influences working adults' willingness to pay (WTP) premium prices for green buildings in Malaysia. In the Malaysian context, relatively few studies focus on working adults' WTP premium prices for green buildings. Aghili et al. (2019) reported that Malaysia has not included management criteria in the green building index. The appropriate management key practices and environmental literacy are required for green building management to reach sustainable development objectives. Besides, most of the studies are related to the real estate market and focus on analyzing the WTP for energy-efficient measures in the residential real estate market.

Green building practices have become increasingly popular in recent years due to the growing awareness of environmental sustainability and the need to reduce carbon emissions. One key factor that has emerged is the willingness of working adults to pay a premium for green buildings in Malaysia. Here are some new contributions to green building that have increased working adults' willingness to pay a premium. First is environmental literacy and sustainability: green buildings are designed to reduce carbon emissions and minimize environmental impact, which is increasingly important to working adults who are environmentally conscious. This has led to a greater willingness among working adults to pay a premium for buildings that prioritize environmental sustainability. The second is aspiration of responsibility: many companies have started to prioritize sustainability as part of their corporate social responsibility initiatives. This has led to a greater willingness among working adults to pay a premium for buildings that align with their company's values and initiatives. These new contributions of green building have increased working adults' willingness to pay a premium for buildings that prioritize their health,

productivity, cost savings, environmental sustainability, and corporate responsibility. As a result, green building practices are likely to become increasingly prevalent in the future as working adults demand buildings that meet their evolving needs and values.

The study is structured in the following manner: in Sect. "Literature review", the relevant literature presents the theoretical grounding of the conceptual framework and hypothesis development. Section three explains the research design, data collection method, measurement of constructs, assessment of common method variance, multivariate normality, and data analysis method. Section four presents the findings of the demographic profile and a step-by-step analysis of the partial least squares technique, including measurement and structural model assessment. Finally, this study elaborates on the major findings, discussion, implications, limitations, and future scope of the study simultaneously.

## Literature review

### Theoretical foundation

Behaviors can be influenced by norms, beliefs, values, and attitudes toward the environment. Stern et al. (1999) recommended the value belief norm (VBN) on the environment and suggested that pro-environmental behavior is built on a causal chain of representational components. Ajzen (1991) postulated that the theory of planned behavior (TPB) evaluates attitudinal components in predicting and explaining behavior. According to Kaiser et al. (2005), TPB measures learning environmental behavior and explains consumers' intention and behavior. To this effect, this study used the theory of value belief norm and theory of planned behavior to explore working adults' WTP for green buildings. The TPB highlights the attitudinal facets of behavior (Sánchez-García et al. 2021). Based on this concept, this study explored the relationship among environmental literacy, environmental beliefs, an incentive for green building buyers, an ascription of responsibility, awareness of consequences, and perceived behavioral control. VBN theory emphasized the significance of moral components (Arias et al. 2022). Accordingly, this study used the concept of value belief norm theory and investigated the significant relationship between the ascription of responsibility, awareness of consequences, perceived behavioral control, and WTP premium prices for green buildings.

There is a lack of research on the factors that influence working adults' willingness to pay a premium for green buildings. While there have been studies conducted on the general attitudes and awareness of green buildings among the Malaysian public, including working adults, there is a dearth of research specifically focused on their willingness

to pay a premium for green buildings (Zuo and Zhao 2014). A lack of study on the specific factors that influence consumers' decision-making when it comes to choosing between green and non-green buildings (Rosner et al. 2022). This includes factors such as perceived benefits of green buildings, environmental attitudes, responsibilities, and other relevant factors (e.g., incentives for green building buyers, awareness of consequences, and perceived behavioral control) that may impact their decision to pay a premium for green buildings. These gaps in the literature on the factors that influence working adults' willingness to pay a premium for green buildings in Malaysia can have important implications for the green building industry and sustainable development in the country.

### The green building industry in Malaysia

Green building refers to the resource efficiency, energy performance, indoor environmental quality, lifecycle effects, and low-waste emissions that are integrated into the building technology systems to develop its management efficiency and inhabitant functions (Xie and Gou 2020). Abisuga and Okuntade (2020) indicated that the development of green buildings started as early as 1976–1980. Green building for environmental quality has become one of the key drivers in nation development. Malaysia's government is actively ratifying policies to ensure affordable and quality houses to all nations (Shafiei et al. 2017). It implies that the adoption of sustainable construction and green buildings has become prominent in the Malaysian building industry. Green buildings that are built by Malaysia aim to use less energy and resources, as well as to mitigate health and environmental risks.

### Environmental literacy

Environmental literacy is a crucial component of the green building since people who are life-long building customers and tenants can have significant influence over resource preservation estimates, such as energy efficiency and material recycling (Gill et al. 2011; Chengqin et al. 2022). The conceptualization of environmental literacy is a mix of social and environmental proficiency that endeavors to string together the complicated association between human development biological healthcare wellbeing. People's environmental literacy may solve complex environmental challenges. Edsand and Broich (2020) pointed out that people's literacy on environmental issues can change awareness into an issue looking for environmental elements. Klein et al. (2021) and Tsirmpa et al. (2021) examined the significant relationship between environmental literacy and environmental belief in a different context. Curdt-Christiansen (2021), and Garcia and Cobar-Garcia (2022) identified the positive relationship between environmental literacy and

awareness of consequences. Saribas et al. (2017) reported that environmental literacy could improve an individual's beliefs about self-efficacy. Regarding this effect, this study proposes that environmental literacy has a significant impact on awareness of consequences and environmental beliefs among working adults in Malaysia.

Hypothesis (H<sub>1</sub>): Environmental literacy has a positive effect on environmental beliefs.

Hypothesis (H<sub>2</sub>): Environmental literacy has a positive effect on awareness of consequences.

## Environmental beliefs

Environmental beliefs are connected with environmental behavioral attitudes. People are involved in environmental issues and exhibit pro-environmental behavior as they believe in and are worried about the personal consequences of environmental issues (Hansla et al. 2008). In other words, the awareness of consequences has a positive impact on environmental beliefs (Liobikienė & Poškus 2019). Khan et al. (2020) stated that awareness depends on understanding the extent of particular actions. Rosenthal (2022) discussed the positive and significant effect of environmental beliefs and awareness of consequences in the context of climate change beliefs, whereas D'Arco and Marino (2022) identified the positive and significant relationship between environmental behavior and awareness of consequences. Liobikienė et al. (2020) found that environmental beliefs have a positive and direct effect on preservation behavior. The environmental belief might be reflected by the awareness of the environmental-related issues (Anthony et al. 2020). Ogiemwonyi et al. (2020) postulated that awareness of consequences about the environment is a crucial part of behavioral science, as it is comprised of environmental beliefs. Therefore, this study postulates that environmental beliefs may reflect awareness of consequences among Malaysian working adults and their willingness to pay for green buildings.

Hypothesis (H<sub>3</sub>): Environmental beliefs has a positive effect on awareness of consequences.

## Incentives for green building buyers

Incentives for green building buyers are crucial to promoting green building, as they are a means to facilitate sustainable development in the green building industry (Rana et al. 2020; Fan and Hui 2020). The incentives for green building are incentive categorization (Onuoha et al. 2018), its viability on green structure advancement, analysis of green motivating force execution, and approaches to boost green structure (Olubunmi et al. 2016). Some studies have argued in favor of the effectiveness, criticisms, strategies, and development of government incentives (Olubunmi et al. 2016; Gou et al. 2013; Heijden 2012), while others have

upheld outer and inner impetuses for green structure purchasers (Olubunmi et al. 2016; Bond 2010). Rosner et al. (2022) found a significant relationship between incentives and perceived behavioral control. Duong et al. (2022) identified a significant and positive effect between incentives and perceived behavioral control in the context of green purchase intention. This study proposes that incentives for green building buyers reflect Malaysian working adults' perceived behavioral control. Thus, we postulate that:

Hypothesis (H<sub>4</sub>): Incentives for green building buyers has a positive effect on perceived behavioral control.

## Awareness of consequences

The awareness of consequences (AC) is crucial for people to perform pro-environmental behaviors. It must prompt a credited duty to perform the behaviors that in turn actuate a personal norm to perform said behaviors (Hansla et al. 2008). De Groot and Steg (2009) stated that AC refers to whether an individual is aware of the negative effects on other people or other belongings. Sang et al. (2020) reported that people's pro-environmental behavior is anticipated by their AC. AC and ascribing responsibility may lead to activating an individual's sense of moral obligation (Han 2020), as they are the key components of social behaviors (Schwartz 1994). Stern (2000) pointed out that AC is associated with people's consciousness about harmful environmental consequences when they act in a way that is not aligned with being environmentally friendly. Gao et al. (2022) investigated the positive and significant relationship between awareness of consequences and ascription of responsibility in the context of digital contract tracing apps. Walker et al. (2021) discussed the importance of awareness of consequences and willingness to pay premiums in the context of sustainable food packaging. Van Doorn and Verhoef (2011) and Anselmsson et al. (2014) explored the relationship between awareness of consequences and consumers' willingness to pay for products. In line with this effect, this study proposes the following hypotheses:

Hypothesis (H<sub>5</sub>): Awareness of consequences has a positive effect on the ascription of responsibility.

Hypothesis (H<sub>6</sub>): Awareness of consequences has a positive effect on willingness to pay for green buildings.

## Ascription of responsibility

Ascribing responsibility (AR) refers to the sense of duty surrounding negative consequences that do not stem from social interaction (De Groot & Steg 2009; Borusiak et al. 2020). Han et al. (2020) stated that AR indicates people's feelings of responsibility for adverse environmental consequences resulting from non-green behaviors. Han (2020) pointed out that an individual's pro-environmental behavior is predicted

by the ascription of responsibility. Borusiak et al. (2020) found that the AR of environmental issues is positively associated with buying behavior. Landon et al. (2018), Sang et al. (2020), and Kyle et al. (2020) hypothesized that AR could influence consumers' green conservation behaviors. Nelson et al. (2021) identified the significant and positive relationship between the ascription of responsibility and willingness to pay in the context of green hotels. Xiao et al. (2021) discussed the importance of the ascription of responsibility and willingness to pay in the context of green behavior toward a low-carbon society. Regarding this effect, we argue that AR may lead to working adults' willingness to pay for green buildings. Thus, this study postulates that:

Hypothesis (H<sub>7</sub>): Ascription of responsibility has a positive effect on working adults' willingness to pay for green buildings.

### Perceived behavioral control

Perceived behavioral control refers to the belief that an individual will approve and preserve an unusual behavior (Ajzen 2011). Ngah et al. (2020) explained the relationship between consumers' perceived behavioral control and their willingness to pay for products. In a study on green behavior, Zhang et al. (2018) found that perceived behavioral control could have a significant impact on willingness to pay for green housing. Schniederjans and Starkey (2014) postulated that an individual's perception of behavioral control might significantly affect his/her willingness to pay for services. If a consumer has high levels of perceived behavioral control, this suggests that they would be more willing to pay for green buildings (Zhang et al. 2019), have a more positive outlook on organizations investing in green transportation initiatives (Ngah et al. 2020), and be more willing to pay for green packaging (Hao et al. 2019). Zhang et al. (2021) examined the relationship between perceived behavioral control and willingness to pay for urban heat island effect mitigation. Kasilingam and Krishna (2022) identified the positive effect between perceived behavioral control and willingness to pay for the internet of things services. To this effect, we hypothesize that:

Hypothesis (H<sub>8</sub>): Perceived behavioral control has a positive effect on working adults' willingness to pay for green buildings.

### The mediating effect of awareness of consequences

The mediating effect of awareness of consequences indirectly influences the willingness to pay for green buildings through environmental literacy and environmental beliefs. Sang et al. (2020) found that AC indirectly influences willingness to pay. Similarly, a series of studies explained that AC positively affects consumers' willingness to exhibit

environmental behavior (De Groot and Steg 2009; Sang et al. 2020; Yue et al. 2020), and this plays a mediating role in the relationship between environmental beliefs, awareness, and willingness. Yue et al. (2020) indicated that environmental behavior is an inclusive and universal view of environmental issues. Cole (2019) stated that effective environmental action entails critical environmental literacy. In line with this, we propose the following hypothesis:

Hypothesis (H<sub>9</sub>): Awareness of consequences mediates the effect of environmental literacy and environmental beliefs on Malaysian adults' willingness to pay for green buildings.

### The mediating effect of perceived behavioral control

In general, psychological factors can also affect working adults' willingness to pay for green buildings. Earlier studies explained that the mediating effect of perceived behavioral control is underpinned by a significant association between psychological factors and willingness or intentions (Dalila et al. 2020; Giantari et al. 2013). According to TPB, perceived behavioral control is expected to mediate the link between consumers, psychological factors, and willingness. These effects can reflect working adults' willingness, as they have been found to influence the course of actions that individuals choose to pursue and how much stress they face in coping with environmental demands. In line with this, this study proposes the following hypothesis:

Hypothesis (H<sub>10</sub>): Perceived behavioral control mediates the effect of incentives on green building buyers' willingness to pay for green buildings (based on working adults in Malaysia).

### The mediating effect of ascription responsibility

The ascription of responsibility alludes to working adults having accountability for the unsuccessful results made by their willingness to pay for a building. Based on the VBN and the TPB analysis of mediating effects, working adults should know about the unfriendly ecological impact of their exercises before they feel obliged to make supportive of natural moves. Previous studies have found that awareness of consequences can play a significant role in predicting the ascription of responsibility (Shin et al. 2018; Han et al. 2019; Sang et al. 2020). Loaiza-Ramírez et al. (2022) examined the mediating role of consumers' perceived comfort on the relationship between renewability of the energy source and the willingness of consumer to pay the premium. Hence, if working adults do not comprehend the adverse consequences of green structure, they will confront challenges and might be attributed some liability regarding these outcomes. Similarly, if working adults are mindful of the

adverse environmental impact, they will form the obligation. Thus, we postulated that:

Hypothesis (H<sub>11</sub>): Ascription of responsibility mediates the effect of awareness of consequences on working adults’ willingness to pay for green buildings.

All the hypothesized and tested associations are presented in Fig. 1 below.

## Research methodology

### Research design

To measure the effect of environmental literacy, beliefs, incentives, the ascription of responsibility, awareness of consequences, and perceived behavioral control that influences working adults’ willingness to pay premium prices for green buildings in Malaysia, this study used a cross-sectional design and collected quantitative data from working adults in Malaysia. The population of this study was composed of working adults in Malaysia aged between eighteen and sixty years. Due to mobility issues during the COVID-19 lockdown, this study used an online survey method using Google Forms, a professional online questionnaire survey platform that allows the stipulation of various question types, storage of answers, and handling of data. The online survey structure featured the purpose and dealing process of the study. Before the survey, informed consent was obtained from the respondents. The survey was appropriated by sharing the connection

by means of email and different online entertainment stages including Facebook and WhatsApp. The data collection for this research took place from June to August 2020, and a total of 1198 usable responses were collected. A total of 1500 questionnaires were sent to the potential respondents and 1205 responses were returned. After the data scanning procedure, seven responses were identified with incomplete information; thus, this study identified 1198 valid responses for data analysis that indicated a response rate of 79.86%.

The power of the 1198 samples was assessed utilizing G\*Power 3.1.9.2 form. Applying G\*Power yielded a power of 0.97 at a significance level of 0.05. The acquired value was bigger than 0.80, demonstrating a suitable degree of test power in this study (Chin 2001). As indicated by Faul et al. (2009), the example size met the expected ability to dismiss the invalid speculation (null hypothesis). *T*-test was run on the early and late reactions to find non-response bias. The findings indicated no significant contrasts between the two samples.

### Measurement of constructs

The empirical study was conducted using a self-administered questionnaire, which was divided into eight sections: demographic information, environmental literacy, environmental beliefs, incentives for green building buyers, awareness of consequences, ascriptions of responsibility, perceived behavioral control, and willingness to pay for green buildings. A five-point Likert scale was used in this study to assess all items of the constructs except for the demographic

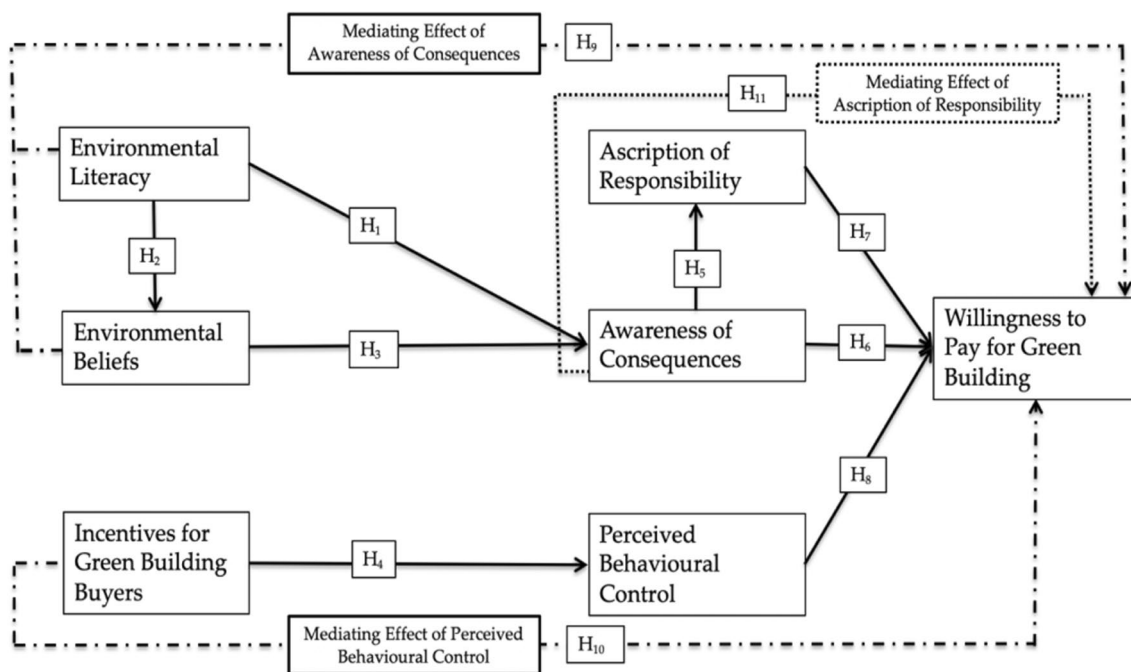


Fig. 1 Research framework

information of the participants. The measurement items were adapted from the existing literature of this study to certify content validity. The scales for environmental literacy were adopted from Nunez and Clores (2017) and Maichum et al. (2016), while environmental belief items were based on Xie et al. (2017). The items of incentives for green building buyers were adapted from Portnov et al. (2018a, b). The scales of awareness of consequences were modified from Portnov et al. (2018a, b), and the items for the ascription of responsibility were adapted from Zhang et al. (2013) and Sang et al. (2020). Next, items for perceived behavioral control were adopted from Armitage and Conner (2001), Kim and Han (2010), and Maichum et al. (2016), while the items for willingness to pay for green buildings were modified from Afroz et al. (2015). All items used in this study presented in Supplementary Table 1.

### Assessment of common method variance (CMV)

Sociology research strategies are associated with common method bias is started utilizing a solitary source and a single time point (Podsakoff et al. 2003). Harman's one-factor test was applied in this study to decide the impact of CMV, as recommended by Podsakoff et al. (2003). The single factor represented 32.595%, which is beneath the suggested value of 50% in Harman's one-factor test that supports the irrelevant impact of CMV on this study. Moreover, the recommended assessment decided on the connections among the latent variables, wherein a relationship that scored underneath 0.9 indicates the absence of CMV (Podsakoff et al. 2003). The present study satisfied this requirement as well (Podsakoff et al. 2003). This study assessed the CMV by using the concept of Kock's (2015) reference to test the full collinearity of all variables. The variable used in this study regressed on a normal variable, and variance inflation factor (VIF) values were under 3.3 (most extreme VIF worth of 2.52 for awareness of consequences), in this manner demonstrating the absence of bias from the single-source data.

### Multivariate normality

Multivariate normality is an important assumption in many statistical techniques, therefore, measuring multivariate normality is important to ensure that the statistical techniques used are appropriate for the data being analyzed and that the results obtained are accurate and reliable. One of the key properties of the multivariate normal distribution is that any linear combination of the variables also follows a normal distribution. This property makes the multivariate normal distribution very useful in statistical inference and hypothesis testing. For this study, the multivariate normality was evaluated using the Web Power online tool (Source: <https://webpower.psychstat.org/wiki/tools/index>). The  $p$  values of

Mardia's multivariate skewness and kurtosis are less than 0.05, confirms the non-normality of the data (Cain et al. 2017).

### Data analysis method

The partial least square technique (SmartPLS 3.1 version) was used to evaluate the reliability and hypothesis relationship among the constructs. SmartPLS is a multivariate examination instrument that evaluates the way models with composite-based latent variables. In the first stage, the measurement estimation was performed to test the reliability and validity analysis (Hair et al. 2017; 2019). Then, the subsequent stage included the evaluation of the structural model using the bootstrapping method with 5000 resamples for the relationship between the dependent and independent variables. Model estimation was performed with  $r^2$ ,  $Q^2$ , and effect size of  $f^2$  to describe the path effect of the constructs (Hair et al. 2019). The mediating effects of ascription of responsibility, awareness of consequences, and perceived behavioral control were investigated to determine the impact on WTP for premium prices for green buildings using the PLS-SEM Bootstrapping method (Hair et al. 2019). The relative importance of various constructs in explaining various other constructs in the structural model is provided by standard PLS-SEM analysis. Importance-performance map analysis (IPMA) is a useful tool that is commonly used in business and market research to help organizations identify areas of improvement in their products or services. In addition, IPMA is an effective tool for businesses to use to understand their customers' needs and expectations, prioritize improvement efforts, and gain a competitive advantage in the market (Wanasida et al. 2021). Hence, IPMA expands the findings of the PLS-SEM assessment by accounting for each construct's performance, allowing for the drawing of conclusions on two dimensions (i.e., both importance and performance), which is crucial when prioritizing managerial actions.

## Results

### Demographic characteristics

The respondents' information is illustrated in Table 1. Male respondents made up 47.6% of the sample and females made up 52.4%. The majority of the working adults' age group was 21–25 years (48.4%), followed by 18–21 years (28.2%), 26–30 (9.6%), 36–40 (2.3%), 41–45 (2%), 46–50 (2.2%), 51–55 (1.3), 56–60 (0.9%), and above 60 years (0.6%). In terms of ethnicity, Chinese participants made up 88.3%, 3.1% were Malaysians, 2.9% were Indians, and other ethnicities made up 5.7%. Working adults living in urban areas

**Table 1** Demographic characteristics

	<i>N</i>	%		<i>N</i>	%
Gender			Marital status		
Male	570	47.6	Single	1033	86.2
Female	628	52.4	Married	147	12.3
Total	1198	100.0	Divorced	9	0.8
			Widowed	9	0.8
Age group			Total	1198	100.0
Below 21 years	338	28.2	Education		
21–25 years	580	48.4	Secondary school certificate	211	17.6
26–30 years	115	9.6	Diploma/technical school certificate	260	21.7
31–35 years	53	4.4	Bachelor degree or equivalent	689	57.5
36–40 years	28	2.3	Master's degree	29	2.4
41–45 years	24	2.0	Doctoral degree	9	0.8
46–50 years	26	2.2	Total	1198	100.0
51–55 years	16	1.3	Monthly income		
56–60 years	11	0.9	Below RM2500	756	63.1
> 60 years	7	0.6	RM2501-RM5000	282	23.5
Total	1198	100.0	RM5001-RM7500	77	6.4
Ethnicity			RM7501-RM10,000	36	3.0
Malay	37	3.1	RM10,001-RM12500	18	1.5
Chinese	1058	88.3	More than RM12500	29	2.4
Indian	35	2.9	Total	1198	100.0
Others	68	5.7	Employment status		
Total	1198	100.0	Unemployed/unable to work	456	38.1
Living areas			Self-employed	169	14.1
Urban	1028	85.8	Employed full-time	452	37.7
Rural	170	14.2	Employed part-time	112	9.3
Total	1198	100.0	Retired	9	0.8
			Total	1198	100.0

made up 85.8% of the sample and those living in rural areas made up 14.2%; 86.2% of respondents were single, 12.3% were married, and those that were divorced or widowed each made up 0.8%. Most of the respondents had good education levels, with bachelor degrees (or equivalent) making up 57.5%, diploma/technical school certificates accounting for 21.7%, secondary school certificates making up 17.6%, master's degree making up 2.4%, and doctoral degree making up 0.8%. The monthly income of most respondents (63.1%) was below RM25000, followed by RM2501-RM5000 (23.5%), RM5001-RM7500 (6.4%), RM7501-RM10,000 (3%), more than RM12500 (2.4%), and RM10,001-RM12500 (1.5%). In terms of the employment status of the respondents, those who were unemployed/unable to work accounted for 38.1%, those who were employed full-time accounted for 37.7%, those who were self-employed made up 14.1%, those who were employed part-time accounted for 9.3%, and those who were retired made up 0.8%.

## Reliability and validity analysis

Cronbach's alpha test was applied for each of the constructs to evaluate the reliability of the study. Hair et al. (2017) indicated that the accepted requirement of Cronbach's alpha value is 0.70. The Cronbach's alphas for environmental literacy, environmental beliefs, incentives for green building buyers, awareness of consequences, ascription of responsibility, perceived behavioral control, and WTP premium prices for green buildings were 0.820, 0.807, 0.866, 0.860, 0.867, 0.857, and 0.891, respectively, which indicated sufficient reliability levels. Golbazi et al. (2020a, b) measured the reliability and validity assessment in the context of students' perceptions on higher education and their WTP for green buildings. The existing study measured the construct validity using convergent validity and discriminant validity. Hair et al. (2017) reported that if average variance extracted (AVE) value is greater than 0.50 and composite



reliability (CR) value of each construct is larger than 0.70; then, convergent validity will meet the requirement. The findings of this study show that the AVE score of each construct exceeded 0.50 and the CR of each factor exceeded 0.70 (Table 2), suggesting that there is convergent validity in the study. The minimum value of Dijkstra-Hensle’s rho was 0.807, which exceeded the threshold of 0.70 (Hair et al. 2019). The variance inflation factor (VIF) value for each factor was less than 3.3, indicating there was no multicollinearity issue in the structural model.

The discriminant validity (DV) was assessed utilizing the Fornell-Larcker standard and heterotrait-monotrait ratio (HTMT). In light of Fornell and Larcker (1981), DV is accomplished when the square root of the AVE for each variable surpasses the comparing connection among the other variable. The findings at the top of each column in Table 3 show the AVE square root is bigger than the values in the same row and column, which demonstrates a satisfactory level of discriminant validity. In addition, for the robustness of the DV, heterotrait-monotrait (HTMT) ratio is used to identify HTMT ratios were under 0.90. It implies that DV meets a satisfactory level, and the variables of this study were conceptually distinct (Henseler et al. 2015). Besides, the results indicated that the cross-loading achieves a significant level of DV (Supplementary Table 1).

**Path analysis**

The path coefficient, *t*-value, significant level, predictive relevance ( $Q_2$ ), and *F*-square ( $f^2$ ) values were computed for the assessment of the structural model (Table 4). The results reveal that environmental literacy has a significant influence on environmental beliefs ( $\beta = 0.394, t = 14.741$ ); thus, hypothesis  $H_1$  was supported. The study examined the factors affecting awareness of consequence among working adults in Malaysia; the result indicates that environmental literacy ( $\beta = 0.239, t = 8.623$ ) and environmental beliefs ( $\beta = 0.527, t = 19.933$ ) are greatly associated with awareness of consequence, thereby supporting hypothesis  $H_2$  and  $H_3$ . Incentives for green building buyers had a significant impact on perceived behavioral control ( $\beta = 0.419, t = 16.825$ ). This finding statistically indicates that hypothesis  $H_4$  was supported. Awareness of consequence is positively related to the ascription of responsibility ( $\beta = 0.649, t = 34.009$ ); thus, hypothesis  $H_5$  is accepted. This study examined the factors affecting working adults’ WTP premium prices for green buildings, and the results reveal that awareness of consequences ( $\beta = 0.042, t = 1.318$ ) has an insignificant impact on WTP premium prices for green buildings; therefore, hypothesis  $H_6$  was not supported. However, the ascription of responsibility ( $\beta = 0.222, t = 6.015$ ) and perceived behavioral control ( $\beta = 0.465, t = 16.417$ ) have a significant effect on

**Table 2** Reliability and validity

Variables	No. items	Mean	Standard deviation	Cronbach’s alpha	Dijkstra-Hensle’s rho	Composite reliability	Average variance extracted	Variance inflation factors
Variables	No. items	Mean	SD	CA	DG rho	CR	AVE	VIF
EL	6	3.758	0.694	0.820	0.828	0.869	0.527	1.184
EB	6	4.050	0.605	0.807	0.807	0.861	0.509	1.184
IN	6	4.190	0.655	0.866	0.868	0.899	0.598	1.000
AC	6	4.097	0.654	0.860	0.861	0.895	0.588	1.813
AR	5	3.967	0.733	0.867	0.867	0.904	0.653	1.880
PB	6	3.609	0.774	0.857	0.860	0.892	0.581	1.378
WGB	7	4.666	1.061	0.891	0.926	0.918	0.627	

EL, environmental literacy; EB, environmental beliefs; IN, incentives for green building buyers; AC, awareness of consequences; AR, ascription of responsibility; PB, perceived behavioral control; WGB, willingness to pay for green building. Source: Author’s data analysis

**Table 3** Discriminant validity

	EL	EB	IN	AC	AR	PB	WGB
Fornell-Larcker criterion							
EL	0.726						
EB	0.394	0.713					
IN	0.345	0.607	0.773				
AC	0.447	0.621	0.688	0.767			
AR	0.486	0.588	0.586	0.649	0.808		
PB	0.489	0.343	0.419	0.460	0.490	0.762	
WGB	0.494	0.373	0.407	0.400	0.477	0.593	0.792
Heterotrait-monotrait ratio (HTMT)							
EL	-						
EB	0.476	-					
IN	0.397	0.728	-				
AC	0.528	0.745	0.800	-			
AR	0.575	0.703	0.676	0.752	-		
PB	0.585	0.389	0.449	0.509	0.551	-	
WGB	0.566	0.428	0.448	0.439	0.523	0.661	-

EL, environmental literacy; EB, environmental beliefs; IN, incentives for green building buyers; AC, awareness of consequences; AR, ascription of responsibility; PB, perceived behavioral control; WGB, willingness to pay for green building

Source: Author’s data analysis

**Table 4** Path coefficients

Hypo		Beta	CI—min	CI—max	t	p	r <sup>2</sup>	f <sup>2</sup>	Q <sup>2</sup>	Decision
Factors effecting environmental beliefs										
H <sub>1</sub>	EL → EB	0.394	0.353	0.441	14.741	0.000	0.155	0.184	0.077	Accept
Factors effecting awareness of consequences										
H <sub>2</sub>	EL → AC	0.239	0.194	0.287	8.623	0.000	0.434	0.086	0.253	Accept
H <sub>3</sub>	EB → AC	0.527	0.486	0.570	19.933	0.000		0.415		Accept
Factors effecting perceived behavioral control										
H <sub>4</sub>	IN → PB	0.419	0.378	0.459	16.825	0.000	0.176	0.213	0.087	Accept
Factors effecting ascription of responsibility										
H <sub>5</sub>	AC → AR	0.649	0.621	0.684	34.009	0.000	0.422	0.730	0.273	Accept
Factors effecting willingness to pay for green building										
H <sub>6</sub>	AC → WGB	0.042	-0.013	0.089	1.318	0.094		0.002		Reject
H <sub>7</sub>	AR → WGB	0.222	0.169	0.286	6.015	0.000	0.399	0.044	0.245	Accept
H <sub>8</sub>	PB → WGB	0.465	0.414	0.511	16.417	0.000		0.261		Accept

EL, environmental literacy; EB, environmental beliefs; IN, incentives for green building buyers; AC, awareness of consequences; AR, ascription of responsibility; PB, perceived behavioral control; WGB, willingness to pay for green building. Source: Author’s data analysis

WTP for green buildings, thereby supporting hypotheses H<sub>7</sub> and H<sub>8</sub>. Idris et al. (2022) and Kalfas et al. (2022) highlighted WTP for urban and suburban green space in a different context.

The adjusted r<sup>2</sup> value for the environmental literacy explained 15.5% of the change in environmental beliefs. Environmental literacy and environmental beliefs explained 43.4% of the change in awareness of consequences. Incentives for green building buyers explained 17.6% of the

change in perceived behavioral control and awareness of consequence explained of 42.2% of the change in the ascription of responsibility. The findings also revealed that awareness of consequences, the ascription of responsibility, and perceived behavioral control explained 39.9% of the change in WTP premium prices for green buildings. The f<sup>2</sup> value was estimated by applying the effect size, and the results were as follows: f<sup>2</sup> score of 0.184 for environmental beliefs, 0.086 for environmental literacy, 0.415 for awareness of

consequence, 0.213 for incentives for green building buyers, 0.370 for the ascription of responsibility, and 0.261 for WTP premium prices for green building. Cohen (1988) indicated that the effect sizes 0.02 and 0.15 are measured for small and medium effects, while those above 0.35 are considered high effects. The results revealed that the  $Q^2$  values for environmental value (0.007), awareness of consequence (0.253), perceived behavioral control (0.087), the ascription of responsibility (0.273), and WTP premium prices for green buildings (0.245) were all greater than zero, which signified the predictive relevance of the construct (Fornell & Cha 1994).

**Mediating effects**

The results reveal that the awareness of consequences did not mediate the relationship between environmental literacy, environmental beliefs, and WTP premium prices for green buildings ( $\beta=0.083$ , CI min = 0.057, CI max = 0.110,  $p > 0.05$ ) and ( $\beta=0.098$ , CI min = 0.072, CI max = 0.123,  $p > 0.05$ ), thus rejecting hypothesis  $H_9$ . However, the mediating effect of perceived behavioral control on the relationship between incentives for green building buyers and WTP premium prices for green buildings ( $\beta=0.195$ , CI min = 0.170, CI max = 0.223,  $p=0.000$ ) did support hypothesis  $H_{10}$ . Similarly, the ascription of responsibility was found to mediate the correlation between awareness of consequences and WTP premium prices for green buildings ( $\beta=0.144$ , CI min = 0.108, CI max = 0.186,  $p=0.000$ ); therefore, indicating statistical support for hypothesis  $H_{11}$ . The findings of the mediating effect are reported in Table 5.

**Importance performance matrix**

The importance-performance matrix analysis (IPMA) identified that perceived behavioral control appeared as the crucial factor for the performance of the working adults’ WTP premium prices for green buildings (0.465; 66.688). The next most significant factors for the performance of working

adults’ WTP premium prices for green buildings were the ascription of responsibility (0.222; 47.189), incentives for green building buyers (0.195; 79.684), awareness of consequences (0.186; 77.431), environmental beliefs (0.098; 77.431), and environmental literacy (0.083; 69.352). Table 6 illustrates the results of performance and total effect.

**Discussion**

The findings revealed that environmental literacy and environmental beliefs affect the level of environmental awareness. Simultaneously, environmental awareness also influences environmental beliefs, which was theoretically supported. However, this is inconsistent with the results of Edsand and Broich (2020), who found weak evidence on the significant positive relationship between environmental literacy and environmental awareness, thereby contradicting the assumption underpinning the theories used in this study. Wu et al. (2020) stated that environmental literacy plays an important role in improving environmental knowledge, awareness, attitudes, and behaviors. This was supported by the results of this study, as high environmental literacy on green buildings led to greater WTP premium prices for green buildings. Consistently with this, the study of Golbazi et al.

**Table 6** Performance and total effects

Target construct Variables	Purchase of ES	
	Total effect	Performance
Environmental literacy	0.083	69.352
Environmental beliefs	0.098	77.353
Incentives for green building buyers	0.195	79.684
Awareness of consequences	0.186	77.431
Ascription of responsibility	0.222	74.189
Perceived behavioral control	0.465	66.688
Willingness to pay for green building		64.455

Source: Author’s data analysis

**Table 5** Mediating effects

Hypo	Associations	Beta	CI—min	CI—max	<i>t</i>	<i>p</i>	Decision
Mediating effect of awareness of consequences							
	EL → AC → WGB	0.083	0.057	0.110	0.518	0.440	No effect
$H_9$	EB → AC → WGB	0.098	0.072	0.123	0.585	0.500	
Mediating effect of perceived behavioral control							
$H_{10}$	IN → PB → WGB	0.195	0.170	0.223	12.194	0.000	Accept
Mediating effect of ascription of responsibility							
$H_{11}$	AC → AR → WGB	0.144	0.108	0.186	5.904	0.000	Accept

EL, environmental literacy; EB, environmental beliefs; IN, incentives for green building buyers; AC, awareness of consequences; AR, ascription of responsibility; PB, perceived behavioral control; WGB, willingness to pay for green building. Source: Author’s data analysis

(2020a, b) and Chau et al. (2010) confirmed the relationship between environmental behavior and WTP premium prices. Subsequently, this study also identified that environmental belief is a crucial predictor of awareness of consequences, which relates to the study of Maichum et al. (2016) and Chen et al. (2022), who pointed out that green products are widely used around the globe due to their environmental beliefs.

The study found that incentives for buyers of green buildings play an important role in perceived behavioral control. This result is consistent with Ting et al. (2019), who found that perceived behavioral control influences the behavior of green consumers and integrates the incentive mechanism. It is indeed a real fact that various incentive factors (financial, fiscal, and structural) motivate an individual to triumph over a certain ambition. Thus, the incentive package should include key players such as developers, investors, and owners to encourage green building construction by establishing them as the smarter choice in new developments (Hashim et al. 2016).

The study identified a significant and positive relationship between awareness of consequences and ascription of responsibility. The awareness of consequences and ascription of responsibility can lead to an increase in consumers' WTP premium prices for green buildings. This result is consistent with the results of Borusiak et al. (2020) and Sharma et al. (2020), who focused on building sustainable consumption behaviors and pro-environmental behavior. This implies that the study recognizes the potential role of awareness of consequences, ascription of responsibility, and perceived behavioral control on working adults' WTP premium prices for green buildings in Malaysia. This is in line with the study of Golbazi et al. (2020a, b) and Ofek and Portnov (2020), who explored stakeholders and students' perceptions and WTP premium prices for green buildings. The study identified that the majority of working adults in Malaysia were willing to consider paying for green buildings. This is an interesting outcome, as the crucial objective of green buildings is to provide a comfortable and healthy environment for residents.

The study identified that there is no mediating effect of awareness of consequences between environmental literacy, environmental beliefs, and WTP premium prices for green buildings. This is perhaps the cultural fact of awareness of the consequences of working adults in Malaysia regarding their WTP premium prices in green buildings. Besides, the results indicated that the environmental beliefs of working adults in Malaysia have a direct relationship with awareness of consequences which in turn reflect a WTP premium prices in green buildings. It implies that working adults' environmental belief and awareness of consequences are important, which lead to reflecting WTP premium prices in green buildings in the context of Malaysia. However, this finding is inconsistent with the previous findings of De

Groot and Steg, (2009), Sang et al. (2020), and Yue et al. (2020) who particularly investigated the general consumers' willingness to purchase green housing in a different culture, province, and country.

In this study, the mediating effect of perceived behavioral control was found between incentives for green building buyers and their WTP premium prices for green buildings. The mediating effect of perceived behavioral control between incentives for green building buyers and WTP premium pricing for green buildings may be affected by a number of reasons in the context of Malaysia. First, Malaysia has been actively encouraging green buildings through numerous policies and programs, including the Energy Efficiency and Conservation Act and the Green Building Index (GBI) certification program (Mustaffa and Kudus 2022). These initiatives may increase the perception of behavioral control of consumers toward green buildings due to the fact that they offer precise guidelines and criteria for sustainable building practices. Second, the level of environmental awareness and consciousness among Malaysian buyers may also impact the mediating effect of perceived behavioral control. Buyers may sense more behavioral control over their purchase decisions and the adoption of green building practices if they have a higher level of environmental awareness and concern about the effects of buildings on the environment. Third, Malaysia's culture and social standards may also play a role in influencing the mediating effect of perceived behavioral control. If green buildings are seen as a status symbol or a marker of social responsibility, buyers may be more likely to perceive a greater level of control over their decision to purchase green buildings. In addition, the mediating effect of perceived behavioral control between incentives for green building buyers and their willingness to pay premium prices for green buildings is based on the theory of planned behavior (TPB). According to TPB, working adults' intention to perform a behavior is influenced by their attitudes toward the behavior, subjective norms, and perceived behavioral control.

In the context of green building purchasing, incentives can influence working adults' perceived behavioral control toward green buildings, while awareness of consequences and ascription of responsibility can be influenced by environmental literacy and environmental beliefs about the importance of sustainability. Previous studies have shown that perceived behavioral control has a significant mediating effect on the association between psychological factors and willingness or intentions (Dalila et al. 2020; Giantari et al. 2013). The study also found a mediating effect of the ascription of responsibility between awareness of consequences and WTP premium prices for green buildings. This finding was also supported by previous studies by Shin et al. (2018), Han et al. (2019), and Sang et al. (2020). The findings of the mediating hypothesis indicated that factors affecting the ascription of responsibility, awareness of consequences,

perceived behavioral control, and environmental belief can play a significant role in measuring working adults' WTP premium prices for green buildings. Similarly, the findings of the IPMA assessments, it is indicated that perceived behavioral control, ascription of responsibility, incentives for green building buyers, awareness of consequences, environmental beliefs, and environmental literacy can lead to encouraging working adults' WTP for premium prices in green buildings in Malaysia.

## Implications

### Theoretical implications

The results encompass the research on working adults' WTP premium prices for green building buying behavior in Malaysia. This paper extends the research based on the concept of attitudinal behavior of TPB on the association between environmental literacy, environmental belief, incentive for green building buyer, ascription of responsibility, awareness of consequences, and working adults' perceived behavioral control toward their WTP premium prices in green buildings in Malaysia. In addition, the concept of VBN theory is used to investigate the relationship among the ascription of responsibility, awareness of consequences, perceived behavioral control, and WTP premium prices in green buildings, which theoretically contributes to an evolving stream of research that investigates the impact in the context of Malaysian working adults. There is enough literature highlighting the association between environmental behavior and green consumption (Patwary et al. 2022a), and most of it simply focuses on the drivers of green consumer behavior (Patwary et al. 2022b; Hu et al. 2022), particularly from the organizational policy perspective. Research on the role of working adults' awareness and environmental responsibility in promoting a WTP premium prices for green buildings in the context of Malaysia is still scarce. This study proposes an important mechanism to explore the relationship between incentives for green building buyers and perceived behavioral control; it found that incentives play a crucial role in green behavior. Ascription of responsibility explains the positive effect on WTP premium prices for green buildings, which reveals that environmental concerns lead to promoting sustainable green consumption behavior. Perceived behavioral control and ascription of responsibility also play a mediating role in working adults' WTP premium prices for green buildings.

### Practical and managerial implications

The study has practical implications for policymakers and managers of green industrial policy. The findings reveal that

environmental literacy and environmental beliefs have a significant effect on awareness of consequences, which in turn leads to working adults' willingness to pay for green buildings. To boost green building purchase behavior, policymakers could incorporate environmental literacy to improve the environmental value of management and promote the relationship between human activities and green environmental policy. Furthermore, policymakers can promote working adults' environmental literacy, awareness, and beliefs using multiple communication channels (e.g., TV, social media, and news media) to discuss different environmental issues.

The knowledge derived from this study helps practitioners, construction managers, and stakeholders to recognize the role of governments in fostering and improving collaborative relationships between partners in green construction buildings. Governments can play an important role in encouraging and motivating construction stakeholders to participate in green building initiatives and promote green policy for the development of green buying houses, which may influence individual and working adults' WTP premium prices for green buildings. Rethinking the design and engineering processes, reworking the contractual framework, enhancing on-site execution, incorporating technology and new materials, and retraining the workforce are all necessary to increase productivity and capacity on a green building or construction site. These initiatives demand a large financial commitment, ongoing training and supervision, careful planning, and coordination. Green structures can be offered as a product that differs from traditional structures. The green building sector can improve quality of life, resource conservation, and climate change. When the economic and societal benefits of green buildings are fully appreciated, the willingness of individuals or working adults to pay higher costs for green buildings may be attained. Government and corporate leaders should take initiative in developing legislation and policies that will encourage building construction companies to build and occupy green buildings.

### Conclusion, limitations, and future studies

Regarding the generalizability of the research findings, in this study, the correlation among environmental literacy, environmental beliefs, awareness of consequences, incentives for green building buyers, ascription of responsibility, perceived behavioral control, and WTP premium prices for green buildings was statistically tested from the perspective of working adults in Malaysia. Thus, it is crucial to explore whether the conclusions are pertinent to other groups or other countries' green consumption behaviors and Sustainable Development Goals (SDGs). Green building practices can be linked to several SDGs, depending on the specific aspects and impacts that are considered. Hence, SDGs can consist of affordable

and clean energy as green buildings can reduce energy consumption and reliance on fossil fuels, thereby contributing to the goal of increasing the use of renewable energy sources. Green building technologies and practices can help drive innovation in the construction and building sector, leading to more sustainable and resilient infrastructure. In addition, green buildings contribute to creating more sustainable and resilient cities by reducing carbon emissions, improving air quality, and promoting energy efficiency. SDGs can consider responsible consumption and production because green buildings can support responsible consumption and production by reducing the environmental impact of building and promoting the use of sustainable materials. Moreover, green buildings can play a significant role in mitigating climate change by reducing greenhouse gas emissions, promoting energy efficiency, and adapting to the impacts of climate change. The adoption of green building practices can require partnerships and collaboration between different stakeholders, such as policymakers, builders, investors, and communities, to promote sustainable development.

This study focused on working adults' willingness to pay premium prices for purchasing the green building in Malaysia. Research on the various green products and services in different countries should be conducted to discover the potential influencing mechanism of green environmental behavior on WTP premium prices for green buildings. This study is also aimed at exploring how environmental awareness or responsibility affects working adults' WTP premium prices for green buildings. This study investigated the mediating role of awareness of consequences, perceived behavioral control, and ascription of responsibility. Future studies ought to consider other mediating factors and the moderating role of price sensitivity, environmental beliefs, policy intervention, and purchase convenience to promote different groups of people's WTP premium prices for green buildings.

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**Author contribution** M.K.R, M.M.M, and M.M: conceptualization, methodology, and writing—original draft. A.A.M: conceptualization, methodology, and writing—review and editing.

**Data availability** All data generated or analyzed during this study submitted as supplementary material.

## Declarations

**Ethics approval and consent to participate** This study has been performed in accordance with the Declaration of Helsinki. Written informed consent for participation was obtained from respondents who participated in the survey. For the respondents who participated the survey online (using google form), they were asked to read the ethical statement posted on the top of the form (There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, please do not include your name. Participation is strictly voluntary and you may refuse to participate at

any time) and proceed only if they agree. No data was collected from anyone under 18 years old.

**Consent for publication** Not applicable.

**Competing interests** The authors declare no competing interests.

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