"Do they mean what they say?" Measuring greenwash in the sustainable property development sector

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Received 29 December 2020
Revised 19 June 2021
21 July 2021
Accepted 28 July 2021

Abstract

Purpose – This study aims to measure the greenwash construct in the sustainable property development (GSPD) context. Property development products such as residential homes, which are generally high-priced, require a long-term financial commitment from the consumers. It makes the property development sector unique. Hence, a specific scale is required to measure greenwash activities in this specific context by the marketers. However, the scale available to measure the greenwash construct is general which is not suitable to use in this particular context. The present study is an attempt to fill this gap in the literature.

Design/methodology/approach – Three studies were conducted to develop the GSPD measure in different phases. In developing the scale, qualitative interviews (study 1) were conducted to generate the initial pool of items. The preliminary set of questions were then validated (content and face validity) by experts' opinions. Exploratory factor analysis (using SPSS) was conducted to extract the factor structure of the newly developed measure (study 2) which was then again validated to ensure predictive reliability and nomological validity by using the SEM-PLS technique (study 3).

Findings – The exploratory factor analysis result revealed that greenwash in sustainable property development (GSPD) is a multi-dimensional construct. The dimensions are namely, false claims and misleading claims. The confirmatory composite analysis confirmed these two dimensions.

Practical implications – This newly developed GSPD scale will enable the researchers to measure the greenwash activities practiced by some of the housing developers. Marketers will be conscious to avoid such activities. Moreover, the government agencies may use this scale to monitor measure and deter greenwashing activities by property development companies.

Originality/value – This is a pioneer study that develops and validates a new scale to measure greenwash construct in sustainable property development in a developing context i.e. Malaysia. In addition, this study operationalized the greenwash construct in sustainable property development as a multi-dimensional behavioural construct determined by two dimensions i.e. false claims and misleading claims.

Keywords Greenwash, Sustainable property development, False claims, Misleading claims, Green housing development

Paper type Research paper

Introduction

Due to air and water pollution, global warming and excessive resource deployment, there is a worldwide demand to obtain sustainable products and behave environmentally friendly (Chua *et al.*, 2020; Liu *et al.*, 2020). In addressing this present demand, marketers are also focusing on producing and offering green and sustainable products and services to their consumers (Chua *et al.*, 2016; Jaini *et al.*, 2020; Li *et al.*, 2020). This gave birth to the concept like "eco-friendliness", "green label", "green product", "green consumption", "green packaging", "reuse, reduce, recycle" and the like (Nguyen and Nguyen, 2020; Huang *et al.*, 2018; Quoquab *et al.*, 2020; Saleh Omar *et al.*, 2019). However, such green claims in the advertisement are

Asia Pacific Journal of Marketing and Logistics

1355-5855
DOI 10.1108/APJML-12-2020-0919

turning to be more ambiguous, even sometimes deceptive (Chen and Chang, 2013; de Freitas Netto *et al.*, 2020). Some marketers use such buzzwords to attract environmentally friendly customers just to increase the sales of products/services (Blome *et al.*, 2017; Kim *et al.*, 2017). Such false environmental claims are usually referred to as "greenwash" (Orazi and Chan, 2020; Parguel *et al.*, 2015).

The Oxford Dictionary (2012) defined greenwashing as disinformation that an organization disseminates to demonstrate an environmentally responsible image in front of the public. From a corporate social responsibility perspective, greenwashing is regarded as an advertisement of a dishonest company (Lee *et al.*, 2018). Past studies revealed that greenwashing behaviour can be harmful to consumers, organizations and society at large. In particular, when consumers perceive that a brands/products/services deliver a meaningful environmental commitment with misleading information, a greenwashing perception is formed, which will inhibit consumers from buying the brand's products (Chang and Chen, 2014; Nyilasy *et al.*, 2014), diminishing his/her trust level (Braga Junior, *et al.*, 2019) and boosting his/her perceived risk (Chang and Chen, 2014; Zhang *et al.*, 2018a). Furthermore, when a greenwashing perception is shaped, consumers are likely to share their negative perception of information with others (colleagues, friends, relatives) (Wang *et al.*, 2020). Eventually, their purchase intention of brands/products/services declines (Braga Junior *et al.*, 2019; Chen and Deng, 2016; Nguyen *et al.*, 2019). At the organizational level, Nyilasy *et al.* (2014) found that greenwashing behaviour can negatively affect organization credibility and morality in consumers' sight, which can significantly decrease its market value (Parguel *et al.*, 2015; Sivadasan *et al.*, 2020). From a societal standpoint, an organization's greenwashing can negatively influence public participation in environmental activities (Gillespie, 2008). Therefore, some researchers argued that greenwashing should be handled through government regulations (Lyon and Montgomery, 2015; Sun and Zhang, 2019).

The government regulations are a critical factor in reducing the rate of greenwashing behaviours from the perspective of green supply chain management (Zhao *et al.*, 2012) and corporate social responsibility (Lee *et al.*, 2018). For example, the Chines government introduced two types of regulations to prevent greenwashing, i.e. punishment for greenwashing enterprises and tax subsidy for green innovation (Sun and Zhang, 2019). In terms of punishment, the greenwashing advertiser is ordered to eliminate the influence within the corresponding scope. In addition, the greenwashing advertiser should pay 3 to 5 times the advertising cost as a penalty. In their study, Sun and Zhang (2019) concluded that the government punishment mechanism can effectively control the greenwashing practices of enterprises and ensure the stable development of green innovation by enterprises.

Nevertheless, this negativity in the marketing activity is becoming more prominent in all industries, including the property development sector (Sivadasan and Basiruddin, 2019; Sun and Zhang, 2019). In addressing the demand for the present "go-green lifestyle, the property development sector started developing" "green housing" and "sustainable property development". It can be defined as a healthy facility designed and built in a resource-efficient manner, using ecologically based principles (Koo *et al.*, 2014). It enables the marketers of this industry to remain competitive and increase their market share (Zou, 2019). However, purchasing a property requires long-term commitment and is ascribed as a high-involvement product. This is because such a product is costly, and generally, consumers need to secure a bank's housing loan, which comes with many years of the payback period. Zhang *et al.* (2018a, b) found that consumers who feel cheated by companies that used greenwash as the strategy to attract customers may discontinue the long-term relationship with that company. Thus, greenwashing activities in the property sector should be considered a sensitive issue, as it can harm the image of this sector in the long run. As such, the present study attempts to shed some light on the greenwash phenomenon in this particular industry.

The past studies measured "greenwash" as a unidimensional construct using five items: (1) "this product misleads with words in its environmental features"; (2) "this product misleads with visuals or graphics in its environmental features"; (3) "this product possesses a green claim that is vague or seemingly un-provable"; (4) "this product overstates or exaggerates how its green functionality is"; (5) "This product leaves out or masks important information, making the green claim sound better than it is" (Chen and Chang, 2013). However, this scale is very general and unable to measure the notion of greenwash in the context of the property development industry. This is because this industry sells products that are distinct in nature due to consumers' high involvement with the product itself. Considering this gap, the present study aims to develop and validate "greenwash" in sustainable property development (GSPD).

Indeed, it is crucial for consumers to differentiate genuine claims that take care of the environmental aspect compared to the false ones. According to Zhang *et al.* (2018a, b), consumers are generally not so knowledgeable about assessing the benefits of green property development. Consumers will only learn through their experience when they are residing or using such housing products. Consumers' knowledge of green property development is extremely scarce, especially in developing countries. Thus, it is expected that this study's findings will enhance the awareness level of the consumers on this phenomenon and will open avenues for future studies to embark on such an issue.

The rest of the paper is organized as follows. In the next section, the theoretical basis is discussed, and the construct is conceptualized. The following sections discuss the instrument development the validation process in detail. Finally, the conclusion has been made, implications are discussed and future research directions are presented.

Relevance to measure greenwashing in the sustainable property development context

Although buildings and constructions are crucial in the urbanization process of any nation (Zhang *et al.*, 2018a; Zheng *et al.*, 2012), it also poses a profound negative impact on the natural environment and resources since it leads to a massive amount of noise, dust, water pollution and solid waste (Zhang *et al.*, 2018a). Furthermore, buildings constitute the largest energy-consuming sector, accounting for 35% of global final energy consumption; further, they contribute equally to CO_2 emissions, which is estimated to rise by 50% by 2050 (International Energy Agency, 2013). Green building and/or sustainable property development is an effort to mitigate adverse effects on the environment and resources while simultaneously enhancing positive effects throughout the building life cycle (Zhang *et al.*, 2018a). Green buildings are designed to be ecologically friendly by using resources efficiently, using internal recycling, renewable energy sources, recyclable or biodegradable construction materials, and blending in with the local environment, particularly in out-of-town locations (Yoong *et al.*, 2017). Such green design is likely to become a promising alternative to the harmful conventional property due to its significant contribution long-term sustainability of the environmental (Sivadasan *et al.*, 2020).

Investment in green labelled or green-certified properties garners higher returns in the United States compared to non-certified properties (Zou, 2019). Moreover, LEED (Leadership in Energy and Environmental Design) label assessment and certification is used internationally by housing developers to enhance their brand image in genuinely pursuing sustainability (Zhang *et al.* 2018a, b). Through certification, the associated environmental impacts during the lifecycle of buildings are mitigated (Jensen and Birgisdottir, 2018). More than 100 building certifications systems exist worldwide (Jensen and Birgisdottir, 2018). The objective of all certification systems is to provide methods to assess the environmental and resource-efficient performance of a building (Jensen and Birgisdottir, 2018). However, green certification does not guarantee the absence of greenwash activities by the housing developers (Parguel *et al.*, 2015; Sivadasan *et al.*, 2020).

One of the common greenwashing activities in this sector is "sin of a hidden trade-off" (Hunter, 2014; Schoeman and Gunter, 2018; Terrachoice, 2010), which indicates claiming a product "green" based on one or two attributes without including all necessary aspects to be considered as "green" (Veneziani, 2019). In a survey conducted by Terrachoice (2010), almost 40% of building and construction products were found to commit the "Sin of the Hidden Trade-off". The most common of these single-benefit claims included: air quality (100 products), energy (61 products) and recycled content (41 products).

According to Zhang *et al.* (2018a), Chinese consumers are reluctant to trust green property certifications during the presale stage. However, upon living in such homes, they realise the benefits and energy savings benefits, which is in accordance with the earlier green claims. Thus, afterward, they would even be willing to pay more for such green products. This phenomenon is much more prominent in developing countries where transparent information and green awareness in the property sector are scarce (Zhang *et al.*, 2018b). As such, green certification is not a complete solution to address the greenwash activity by housing developers; thus, an innovative approach to overcome this issue is yet to be available.

The theoretical basis

The theory of motivated cheating and the social cognitive theory (SCT) may help to explain this phenomenon. Taking the help of the theory of motivated cheating in explaining students' cheating behaviour, Link and Day (1992) postulate that students (individuals) may cheat when they do not know the right answer. Conversely, when the correct answer is known, the individual avoids cheating. Considering this theory, in this study, it is assumed that when the marketers do not hold sufficient knowledge about "green", they may tend to engage in greenwashing activities. On the other hand, Smith *et al.* (2017) considered social cognitive theory in explaining students' academic cheating behaviour. According to them, "observed behaviors that do not appear to have consequences serve as motivating factors" (p. 2). They further mentioned that the application of SCT is the reinforcement of the allowance of cheating due to no practical consequences. The findings revealed that most participants who cheated at some point did not face a consequence associated with the behaviour, which seems to reinforce and vindicate the behaviour. In the light of greenwashing, it is assumed that when the marketers who indulge in greenwashing activities do not face any consequence, they tend to continue such behaviour.

The process flow

In order to develop the greenwash measure in sustainable property development (GSPD), this study considered five phases recommended by Quoquab *et al.* (2019) (see Figure 1). In phase one, the construct is conceptualized, and relevant facets are being discussed. In the next phase, the qualitative inquiry has been made to generate the items. In phase three, items were selected based on experts' opinions. In phase four, items were purified, and dimensions were extracted, which was confirmed in phase five by the use of confirmatory factor analysis. In a nutshell, three studies have been conducted: qualitative inquires have been made to generate the initial item pool (study 1). Next, to explore the dimensionality and reduce the items, a quantitative survey was conducted (study 2). Lastly, another set of data were collected to validate the GSPD scale (study 3).

Phase 1: Conceptualization and dimensionality of the greenwashing construct

Conceptualization. In order to conceptualize the greenwashing construct in sustainable property development, the existing literature was extensively reviewed. The term "greenwashing" originally stemmed from "whitewashing" (Vos, 2009). Some researchers suggested that

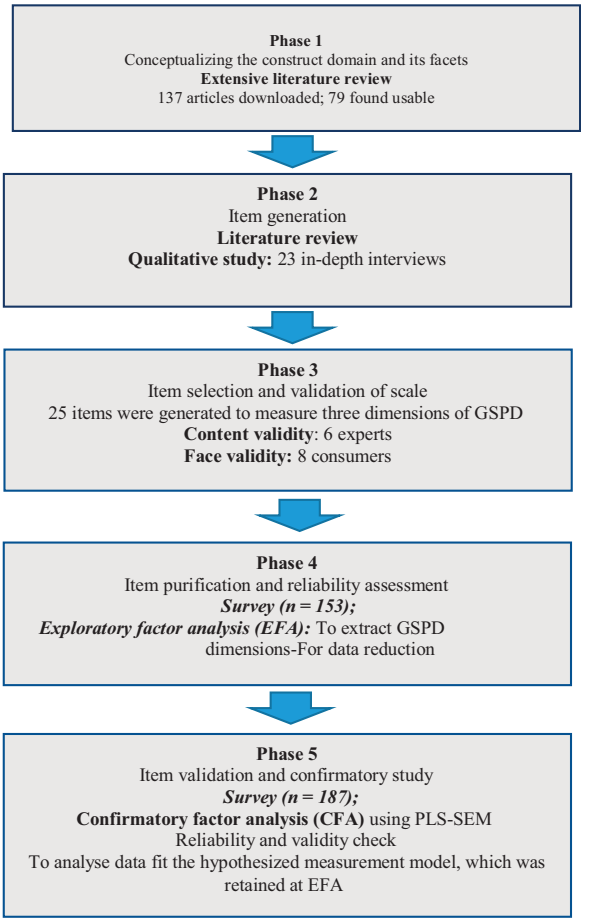

Figure 1.
The scale development phases carried out in this study

greenwashing is not fully unethical since its claims are not completely false even though the company may provide a partially true image and/or information of the company (Albort-Morant *et al.*, 2016; Vos, 2009). However, it is evident that it has a devastating effect on a firm's image (Chen *et al.* 2020), consumers' trust (Chen *et al.*, 2019; Chen and Chang, 2013) and brand equity (Avcilar and Demirgunes, 2017).

Greenwashing practices have significantly increased since 2000 and take on "epidemic proportions" in recent years (Blome *et al.*, 2017; Hsu, 2011; Parguel *et al.*, 2015; Terrachoice, 2010). Mostly, large organizations are accused of practicing greenwashing activities (Braga Junior *et al.*, 2019; Vos, 2009). It is argued that some organizations do not entirely follow green activities in their proper manner but claim that they do (Sun and Zhang, 2019). Possibly such organizations do not intend to provide fake information; rather, they tend to bend the truth or misrepresent their environmental stance to enhance firms' reputation (Nguyen *et al.*, 2019).

It is generally agreed that greenwashing refers to disseminating misleading or incomplete information to its target group of customers (Blome *et al.*, 2017; Kim *et al.*, 2017; Vos, 2009). Some critical definitions of greenwash based on the existing literature are summarized in Table 1.

Author and year of publication	Definitions
Zhang *et al.* (2018c)	Greenwashing is defined as a company's over communication on their environmental performances
Guo *et al.* (2018)	Greenwashing can be ascribed as corporations' environmental claims regarding green products that are ambiguous and deceptive in order to create a positive "green" image without fulfilling the green promises
Blome *et al.* (2017)	Greenwashing can be defined as "misleading consumers regarding the green (often in a broader sense sustainable) performance of a firm or the environmental (sustainable) benefits of a certain practice, product, or service" (p. 339)
Kim *et al.* (2017)	When firms "mislead or embellish their external communications in respect of their environmental actions", it is called greenwash (p. 307)
Lyon and Montgomery (2015)	Greenwash is defined as any communications that mislead people into establishing overly positive belief about an organisation's product, practice and environmental performances
Chen and Chang (2013)	Greenwash is defined as companies practice of over claiming their products environmental functions without substantiating it with convincing data
Parguel *et al.* (2011)	Greenwash is defined as the act of misleading consumers on the company's environmental practice or its products' environmental benefits
Delmas and Burbano (2011)	Greenwash can be defined as company's misrepresentation of its environmental and/or social performance despite its actual environmental and/or social performance being poor
Vos (2009)	Greenwashing is defined as "disinformation disseminated by an organization so as to present an environmentally responsible public image" (p. 674)

Table 1. Definition of greenwash

Source(s): Compiled by the researchers

Based on the definitions provided in Table 1, it can be said that most of the firms become engaged in greenwashing with a motive to attract customers and to increase their environmental image, which they communicate via advertisement or other marketing communication channels. When such environmental claims are vague, semi-true or could not be substantiated with necessary data, such claims are turned to be greenwashing. For this study, the greenwash construct is defined as "property developer's acts of misleading consumers using their marketing strategy (e.g. advertisement) by overstating claims of sustainability and environmental benefits in order to secure sales for their residential housing developments".

Dimensionality. In their study, Smith *et al.* (2017) have found two kinds of cheating behaviour among students: inaccurate (false) and indecisive (confusing/misleading) (Vos, 2009). Past studies also found support for this notion. For example, Carlson *et al.* (1993) suggested that greenwash can be misleading, trivial or deceptive (false) environmental claims. Thus, in this study, it is expected that, in the context of sustainable property development, greenwashing has two broad facets, namely (1) misleading claims and (2) false claims.

This study assumes that a firm can mislead its consumers via confusing information; this assumption is in line with past studies (e.g. Blome *et al.*, 2017; Kim *et al.*, 2017). It may happen when the firm does not provide complete information to the customers; exaggeration is such an example (Lyon and Montgomery, 2015). On the other hand, false claims indicate disseminating fake information via advertisement or other promotional efforts. For instance, a company may communicate positive information about its environmental performance without actually performing it properly (Guo *et al.*, 2018; Zhang *et al.*, 2018c). Thus, the structure of the greenwashing construct in the context of sustainable property development follows second order reflective-reflective construct with a repeated indicator approach specified as model-A (see Figure 2).

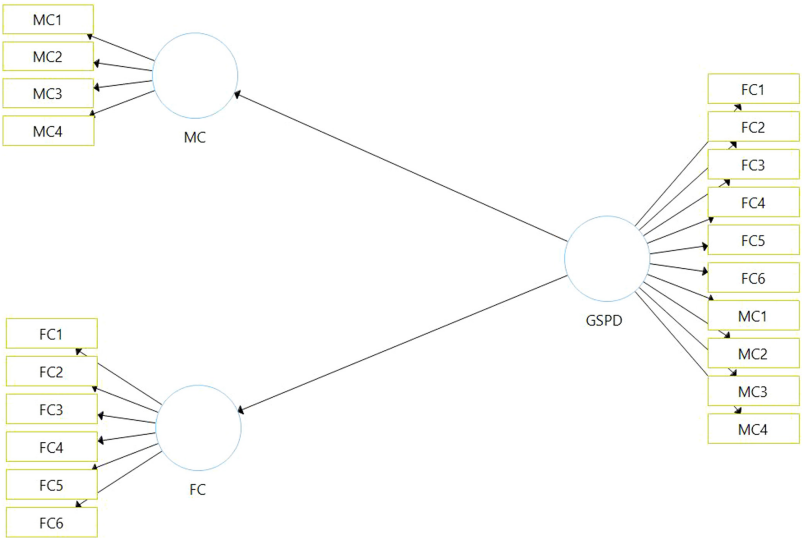

Figure 2.
Measurement model (first order)

Based on this discussion, the "misleading claim" dimension is defined as the act of housing developers in using the information in the environmental advertisement, which is misleading, vague or confusing (Blome *et al.*, 2017; Kim *et al.*, 2017; Lyon and Montgomery, 2015). Conversely, "false claim" is defined as the act of housing developers to convince consumers of their ethical commitments by providing false or fake information (Delmas and Burbano, 2011; Guo *et al.*, 2018; Vos, 2009; Zhang *et al.*, 2018c). The operational definition of the greenwash and its dimensions is provided in Table 2.

Phase 2: Item generation

In order to gain a deeper understanding of the phenomenon, an extensive review of related literature was carried out, and the relevant studies were downloaded from different databases such as Science Direct, Emerald, Sage, Elsevier and Taylor and Francis. The keywords used to search the pertinent articles include "greenwash", "greenwashing", "whitewash" and "window-dressing". Around 137 articles were downloaded and sorted, among which 79 articles were found useful and related. Reviewing relevant literature assisted to define the construct and understand its possible dimensions. Additionally, some preliminary items were generated

Greenwash in sustainable property development
Greenwash is the property developer's acts of misleading consumers using their marketing strategy (e.g. advertisement) by overstating claims of sustainability and environmental benefits in order to secure sales for their residential housing developments

Name of the dimensions	Operational definition
1. False claims	The act of housing developers to convince consumers on its ethical commitments by providing false or fake information
2. Misleading claims	The act of housing developers in using the information in the environmental advertisement, which are misleading, vague or confusing

Table 2.
Operational definition of each dimension

based on the existing literature, which were then further extended and modified with the feedback obtained from the qualitative interviews.

The objective of the qualitative inquiries (study 1) was to produce a set of items that adequately captures the main aspects of the construct and context of the study. Twenty-three specialists were interviewed to generate the initial pool of items. The interviewees were consultants, planners, designers, project managers and marketers involved in the Malaysian property development sector. This process generated 59 potential items.

Phase 3: Item selection

Once the items were generated, the researchers started selecting the items to move into the next stage. In doing so, the researchers sought the help of the content experts to select the most appropriate items and validate the initial pool of items. Six experts were involved in this process – notably, two industry experts and four academicians. The experts were asked for the suggestions, relevance, comprehension, completeness, wording, clarity and simplicity of each item. By following this process, two dimensions were retained based on content experts' opinions. Among 59 items, the content experts found 25 items more relevant to reflect greenwashing activities. Among the deleted 34 items, some of the items were found redundant, and some items were suggested to delete due to their irrelevance, incompleteness and lack of clarity. Table A1 shows the item generated from the interview and selected based on content validity.

In the next stage, face validity was assured for understandability, clarity and readability of the items. Face validity involved eight respondents consisting of four industry experts and four consumers to read and give feedback on the items. All double-barrelled, ambiguous, or unfamiliar terms and complicated words were avoided. Items that contained unclear or unfamiliar terms were clarified and replaced. Moreover, the items that had complicated language were simplified to make it more specific and concise (Öberseder *et al.*, 2014).

Phase 4: Exploring dimensions and item purification

After pre-testing the initial item pool, the second study was conducted upon 153 consumers to purify the measure (study 2). The instrument consisted of 25 items to measure GSPD as verified by experts in the early stage of the research. A five-point Likert scale was used, which consisted of 1 representing "strongly disagree" to 5 representing "strongly agree".

Guided by Hair *et al.* (2006), the exploratory factor analysis (EFA) technique was utilized (using IBM SPSS version 23) to explore the factor structure and to reduce the number of the items of the GSPD scale. Four criteria were used to determine the number of factors: eigenvalues, percent of explained variance by each factor, scree plot and interpretability criteria (Courtney and Gordon, 2013). Based on such criteria, two factors were generated: false claims and misleading claims.

Factor loadings of the items were considered as the decision to delete items. Principal components EFA was used to estimate internal consistency and item-to-total correlations (Churchill, 1979). The construct was first analysed using statistical tools of exploratory factor analysis of principal components with varimax rotation. The initial pool of 25 items was used to run EFA. Among 25 items, 10 items were retained, 7 items were deleted due to low communalities (less than 0.5) and 8 items due to cross-loadings (see Table 3).

Hair *et al.* (2006) suggested that the sample size should be 100 or greater. Moreover, a 1:5 rule of thumb also is suggested for the desired the sample size (Hair *et al.*, 2006). Based on this rule, this study required only 120 samples and, thus, a 153-sample size was deemed optimum for the first study.

Kaiser-Meyer-Olkin: 0.946 Barlett's test of sphericity: 2392.006 (sig: 0.000, df: 153)	Extracted factors*		Communalities
Full set of variables	Factor 1 (false claims)	Factor 2 (misleading claims)	
GW1. XYZ company uses misleading words in the ad to show that they care for the environment		0.779	0.762
GW2. XYZ company misleads its consumers by using visual artist's impressions with green to sell houses		0.758	0.725
GW43. It is easy for XYZ company to mislead its customers to sale its products by using green ad		0.847	0.750
GW10. XYZ company uses misleading visual and/or graphics in the ad to show that it cares for the environment		0.751	0.628
GW17. XYZ company uses word like "environmental protection" in its ad to cheat people	0.793		0.685
GW 21. XYZ company overstates environmental and sustainable functionality of its housing products	0.801		0.705
GW 3. What XYZ company claims in its ads on green, is impossible to do	0.850		0.765
GW12. I think XYZ company is faking on environmental benefits to sell houses	0.839		0.730
GW42. XYZ company over claims its environmental benefits	0.855		0.791
GW10. XYZ company's green features in the advertisements are vague	0.759		0.706
Sum of squares (eigenvalues)	4.466	2.121	
Percentage of trace			
% of variance explained	44.66	21.21	
Cumulative variance	44.66	65.87	
Cronbach's alpha	0.892	0.857	

Table 3.
Results of EFA

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy in this study was 0.932, which is considered adequate to analyse the EFA output, and Bartlett's test of sphericity reached the statistical significance ($p > 0.001$), indicating the correlations were sufficiently large for EFA (Tabachnick and Fidell, 2001). The proportion of variance (communalities) was examined in each variable accounted for by the common factors to give the information about how much of the variance in each item is explained (Pallant, 2007, p. 196).

The communality values were set at 0.50 and above, which indicated the measurement items' validity. Table 3 indicates the factor loadings of all items loaded, their commonalities and Cronbach's α for both dimensions of GSPD. Loading of the items was more than 0.5 (Hair *et al.*, 2006). The Cronbach's alpha coefficients of all items were above 0.7 (Table 3). Nunnally and Bernstein (1994) recommended that the minimum level of acceptance must be 0.70 and above.

Phase 5: Item validation and confirmatory study

Another round of survey was conducted to validate the GSPD measure (study 3). The final data consisted of 187 respondents to further verify items and dimensions identified in phase 4. The respondents were customers of sustainable property developers' products. The demographic profile varied in gender, age, marital status, professions, ethnicity,

income and level of educations. This is to ensure that the respondents represent the criteria of the demography of Malaysian consumers. In terms of gender, more than half of the respondents were female (61% female and 39% male). In Malaysia, women become more financially independent and powerful; their purchasing power increases too, especially for working, urban women who already form a significant consumer group because they "buy for themselves" (Meikeng, 2017). Thus, the greater number of female respondents is justified.

The age of the respondents ranged between 18 and 25 years (16.6%), 26–35 years (29.4%), 36–45 years (40.6%), 46–55 (10.2%) yeas, and more than 55 years old (3.2%). In terms of ethnicity, the majority were Malay Muslims (62.6%), while 23% of the participants were Chinese, 10.7% were Indian and 3.7% were of other ethnicities (e.g. Iban, Sikh, Kadazan).

Measurement model specification. The measurement model specifies the relationship between the latent variables (LVs) and their underlying measures (Henseler *et al.*, 2009; Quoquab *et al.*, 2018). In regard to the formative model, indicators cause the latent variable, whereas, in a reflective measurement model, latent variables cause the items. In this study, GSPD is considered a higher-order latent construct with a reflective – reflective form. This is because the direction of causality for the measurement model starts at the construct and ends at the indicators; thus, the construct is defining and causing the items (Fornell and Bookstein, 1982). Moreover, reflective construct indicators are interchangeable, have similar content, and share a common theme; thus, dropping any item(s) will not change the conceptual meaning of the construct (Jarvis *et al.*, 2003). Additionally, indicators of the reflective construct are expected to be highly correlated, because they are measuring same underlying construct (Ringle *et al.*, 2012).

Measurement model assessment. Before evaluating the measurement model, the common method variance (CMV) was examined since this study utilized a cross-sectional survey method to collect the data (Podaskoff *et al.*, 2003). The main concern is that if CMV exists, one factor is likely to explain the majority of the variance. As suggested by Podaskoff *et al.* (2003), the Harman single-factor test was used to test the CMV. The result of principal component analysis without rotation indicated that the first factor explained less than 50% of the variance; hence, CMV was not a serious issue in this study. In addition, the procedure recommended by Kock (2015) to examine the presence of full collinearity was carried out. The values of variance inflation factor (VIF) for all constructs should be less than 3.3 to claim the absence of collinearity issue (Kock (2015). The output of the PLS algorithm revealed that the values of VIF were less than 3.3, confirming the absence of a CMV issue again.

To estimate the validity and reliability of the measurement model at the first order and second order, and to test the nomological validity of the structural model, partial least squares (PLS) was used (Quoquab *et al.*, 2018). PLS is an advanced statistical technique that can handle complicated models with higher-order constructs and demand less concerning sample size and distribution of data (Hair *et al.*, 2019a). Moreover, PLS can simultaneously estimate the measurement model and the structural model without losing information producing more accurate results (Mohammad *et al.*, 2021). Most importantly, the present study is exploratory in nature and aims to validate the psychometric property of GSPD at the first and second order; hence, the use of SmartPLS is justified. Smart PLS3.0 software (Ringel *et al.*, 2015) was used to estimate the model with a path weighting scheme for the inside approximation. The first order reflective measurement model was estimated in terms of indicator reliability, construct reliability, convergent validity and discriminate validity (Hair *et al.*, 2019b).

This study used the repeated indicator approach to establish the reflective–reflective higher-order construct of GSPD (Becker *et al.*, 2012) (Figure 2). The false claim and misleading claims constructs represent the lower-order of the more general higher-order GSPD construct. All indicators that were used to measure the lower-order constructs were assigned at the same time to identify the higher-order GSPD construct. The higher order measurement model was assessed based on stander procedures suggested by Hair *et al.* (2020) for the path

relationship between the higher and lower order component. In this study, the lower order component reflects the higher order component; therefore, the direction of the relationship is from higher order to lower order, representing loading. Thus, factor loading, Cronbach's alpha, composite reliability and convergent validity of higher order were evaluated.

Psychometric properties of the first-order measures. The measurement model results are shown in Table 4. All average variance extracted (AVE) values were greater than the recommended values of 0.50 (Henseler *et al.*, 2016; Tiamiyu *et al.*, 2020); thus, convergent validity was established. Moreover, the factor loadings of each indicator, composite reliability (CR), and Cronbach's alpha (CA) for each construct surpassed the recommend values of 0.70, 0.8 and 0.70, respectively (Table 4). Thus, all constructs' internal consistency reliability reached a satisfactory level.

The discriminant validity, which indicates to which extent a construct has exclusive traits that make it different from other constructs in the model, was evaluated using Fornell and Larcker's criterion (1981) and the heterotrait-monotrait ratio of correlations (HTMT) (Henseler *et al.*, 2015). According to the first criteria, the square root of AVE should be greater than the correlation with all other constructs in the model. This condition was achieved (see Table 5). According to the second criteria, the HTMT should be significantly smaller than one to discriminate between two constructs (Henseler *et al.*, 2016). More specifically, the HTM values supposed to be less than 0.9 when the variables are conceptually similar (Henseler *et al.*, 2016). Again, this condition was confirmed (see Table 6). Subsequently, discriminate validity was established.

Psychometric properties of the second order measure. Once the reliability and validity are established for the first order measure, the second order measure was assessed for the same purpose. The factor loadings for second order which represent the strength of relationship

Constructs	Items	Loadings	CA	roh-A	CR	AVE
False claims	FC1	0.823	0.918	0.921	0.934	0.737
	FC2	0.834				
	FC3	0.876				
	FC4	0.859				
	FC5	0.888				
	FC6	0.869				
Misleading claims	MC1	0.868	0.86	0.86	0.905	0.704
	MC2	0.842				
	MC3	0.836				
	MC4	0.81				
Happiness	Happy1	0.902	0.914	0.922	0.936	0.744
	Happy2	0.861				
	Happy3	0.846				
	Happy4	0.833				
	Happy5	0.871				

Table 4.
Assessment of the measurement model (first order)

	False claims	GSPD	Happiness	Misleading claims
False claims	*0.858*			
GSPD	–	–		
Happiness	−0.224	–	*0.863*	
Misleading claims	0.774	–	−0.172	*0.839*

Note(s): Diagonal values (in italics) are the square root of AVE; off-diagonal values are the correlation between constructs

Table 5.
Assessment of discriminant validity using Fornell and Larcker (1981) criterion

between first and higher-order surpassed recommended value of 0.70 (Hair *et al.*, 2017). In addition, AVE, CR and CA all surpassed the recommended values of 0.5, 0.8 and 0.7, respectively (Table 7).

The finalized set of items and the dimensions of the GSPD scale are shown in Table A2.

Nomological network of GSPD. This study assessed the nomological and predictive validity of the GSPD measure by examining its relationship with the individual's emotion (e.g. Happiness). Corral-Verdugo *et al.* (2011) revealed that societies that practice environmentally significant behaviour are likely happy societies. In other words, practicing environmentally significant behaviour leads to positive emotions such as happiness (Quoquab *et al.*, 2020). In support of this view, evolutionary psychology suggests that human beings feel happy because their brains evolved to experience positive emotions associated with pursuing other's benefits (Haviland-Jones *et al.*, 2005). Moreover, the norm-of-reciprocity theory can help to explain the link between environmentally significant behaviour and happiness. Particularly, greenwashing activities can negatively affect individuals' emotions and cognition; thus, their happiness, excitement, gratitude, love and contentment can decrease significantly. As such, it can be assumed that if any entity (firm or organization) performs greenwashing activities, i.e. the false and or misleading claims of practicing the environmentally significant behaviour may lead to negative emotion (e.g. unhappiness). It implies a negative relationship between greenwashing and happiness (see Figure 3). Based on this assumption, the following hypothesis is developed.

H1. Greenwashing negatively affects consumers' happiness.

Assessment of nomological validity of GSPD. Nomological validity will be established if the greenwashing scale is negatively and significantly correlated with happiness. A five-item scale to measure happiness was borrowed from Lyubomirsky and Leppers (1999). This construct was valid and reliable based on the values of Cronbach's alpha, composite reliability and AVE (see Table 4). In addition, all the constructs satisfied discriminate validity using Fornell-Lacker and HTMT criteria (Tables 5 and 6). Using PLS bootstrapping procedures with 5000 resample, the results found that greenwashing exerts a negative and significant effect on happiness ($\beta = -0.216$, $t = 2.648$, $p < 0.01$), explaining 15.2% of its variance, which provide support for the H1, and ensuring nomological validity. To estimate the model's predictive capability, blindfolding procedure with an omission distance of 7 was used to generate the Q^2 value for the endogenous construct (Fornell and Cha, 1994). Q^2 values greater than zero indicate that the predictive relevance is acceptable (Hair *et al.*, 2017). This study obtained a Q^2 value of 0.047 for happiness, which is greater than 0. This result confirmed the nomological validity and explanatory power of GSPD as second-order reflective-reflective construct comprising two dimensions.

Table 6. Assessment of discriminant validity using HTMT method

Constructs	FC	GSPD	Happy	MC
False claims				
GSPD	–			
Happiness	0.241	–		
Misleading claims	0.867	–	0.193	

Table 7. Assessment of the measurement model (second order)

Construct	Dominations	Loadings	CA	CR	AVE
GSPD	FC	0.912	0.872	0.911	0.837
	MC	0.901			

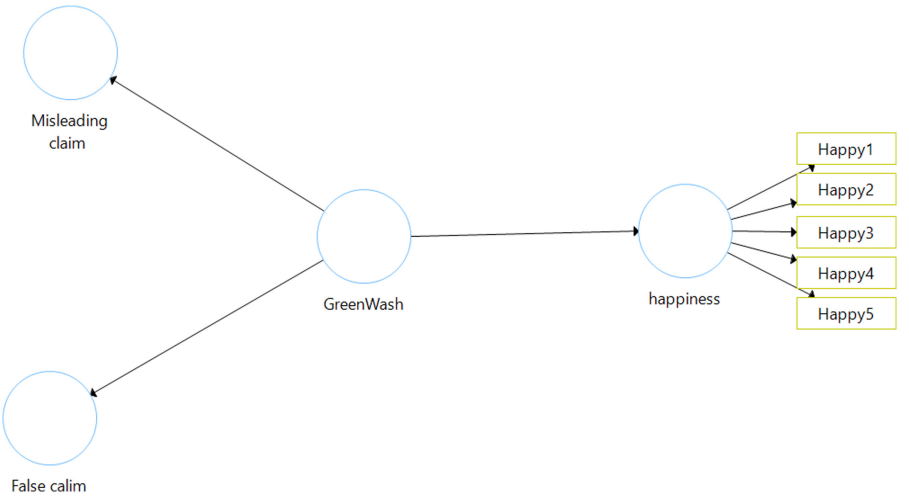

Figure 3.
Nomological network

Predictive assessment of GSPD. The predictive power of GSPD was assessed by testing the models' out-of-sample predictive capability using PLSpredict procedures (Shmueli *et al.* (2016). PLSpredict is based on the concept of separate training and holdout samples for estimating model parameters and evaluating a model's predictive power. A training sample is a portion of the overall dataset used to estimate the model parameters (path coefficient, weights and loadings). The reaming part of the dataset not used in the model estimation is referred to as a holdout sample (Hair *et al.*, 2020). PLSpredict offers two naïve benchmarks to assess the predictive quality of the PLS path model, i.e. Q^2 predict and LM (linear model) (Shmueli *et al.*, 2016). In this study PLSpredcit with 10 folds and 10 repletion was ran on the target construct i.e. happiness. The output of the analysis is summarized in Table 8, demonstrating that the Q^2 predict values for all items of happiness were positive, indicating that the model outperforms the most naïve benchmark (i.e. the indicator means from the analysis sample) (Hair *et al.*, 2019b). Additionally, the prediction error of PLS-SEM in term of RMSE for all items of happiness were smaller than the prediction errors resulting from the linear model (LM), implying that PLS model has strong predictive power.

Discussion

The main objective of this study is to develop a reliable and valid instrument to measure GSPD sector that is new in the literature. There is an existing scale to measure greenwashing construct; nevertheless, it is not suitable to measure the greenwashing in the property development section due to items general meaning.

Items	PLS-SEM RMSE	PLS-SEM $Q^2_{predict}$	LM RMSE	PLS-SEM-LM RMSE
Happy1	1.302	0.019	1.368	−0.066
Happy2	1.333	0.015	1.361	−0.028
Happy3	1.337	0.003	1.388	−0.051
Happy5	1.333	0.025	1.383	−0.05

Table 8.
PLSpredict assessment of manifest variables

By following the steps suggested by Churchill (1979) and Quoquab *et al.* (2019), a sequential exploratory mixed method was considered to develop the scale. First, the relevant literature was reviewed, and qualitative interviews were conducted to generate the initial item pool. This process generated 59 items, which were then validated by content experts and 25 items were retained to move to next stage to run EFA. The output of EFA analysis extracted two dimensions (false claims and misleading claims) and ten items were retained. After that, this purified measure was validated using PLS-SEM on 187 respondents. The results provided evidence of the dimensionality, reliability and validity of the scale. Particularly, at the first order the two dimensions achieved a satisfactory level in terms of composite reliability, Cronbach's alpha, factor loadings, AVE and HTMT values, which confirms the authenticity of the reflective model. At the second order, the GSPD construct also achieved satisfactory values for internal consistency reliability and convergent validity, thereby confirming the reflective model of GSPD at the second order.

Subsequently, the theoretical and empirical evidences supported the arguments presented in this study, i.e. GSPD is a higher-order multi-dimensional latent construct in the form of a reflective-reflective type A. This study also confirms the nomological validity of the higher model by showing a moderate negative relationship between GSPD and happiness. In addition, this study established the predictive validity of the newly develop scale by demonstrating its capability in predicting future data not available in the model.

Theoretical and managerial implications

This is a pioneer research that conceptualizes, develops and validates a multi-dimensional scale to measure greenwash in the sustainable property development sector. The theory of motivated cheating and social cognitive theory provides the basis on which the multi-dimensional scale of GSPD is developed. By doing this, this study contributes to the sustainable development literature, especially in the property sector. Furthermore, this study improves the conceptual definition of GSPD by considering two major dimensions of greenwash. Past studies measure this construct as unidimensional using general items. This research measures GSPD as a multidimensional construct reflected in two dimensions, i.e. false claims and misleading claims with specific items embedded in the property industry. *Additionally,* this research has confirmed the validity and reliability of this newly developed scale at the first and second order. This can open a new avenue for researchers from Asia and developing contexts to use this scale in their relevant studies. In addition, this newly developed GSPD scale is likely to enable researchers to understand the greenwashing phenomenon with the empirical outcome from the sustainable property development perspective in Malaysia.

Methodologically, this study employed a sequential mix method, i.e. the qualitative method followed by the quantitative method, to develop the new scale of GSPD. The systematic, scientific and rigorous processes followed by this study can be used by other researcher in social science to develop a new measure. Furthermore, evaluating the second-order reflective construct of GSPD enables researchers to conduct empirical studies based on the reflective measurement theory. In summary, this research contributed to understanding the greenwash construct in the sustainable property development context.

Practically, this research is likely to enhance consumers' awareness and consciousness while purchasing green house or sustainable property. It is expected that the marketers and policymakers will be able to segment their customers based on this scale to fulfil their needs better. Furthermore, the GSPD scale can be utilized to measure greenwashing in other similar industry contexts that claim to offer green benefits and functionality. The study findings provide significant implications for the marketers of the sustainable property industry by exhibiting that false claims and misleading claims are detrimental to the firm's ultimate success. It is expected that these study findings will create more awareness among

consumers to understand greenwashing activities. Additionally, consumers will benefit by purchasing sustainable property from genuine housing developers.

Limitations and future research directions

Although this study contributes to the body of knowledge about greenwashing in the sustainable property development sector, it is not beyond some limitations. However, the limitations of this study can serve as future research directions. In this study, the data were collected mostly from urban areas. Thus, future studies can collect data from rural areas and compare the result with data collected from urban areas. In addition, this study collected data using the cross-sectional method; future studies can use the longitudinal study to enhance the generalizability of the results. Moreover, future studies can test this scale in other country contexts in order to see the greater usability of the scale.

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Further reading

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Quoquab, F., Pahlevan, S., Mohammad, J. and Thurasamy, R. (2017), "Factors affecting consumers' intention to purchase counterfeit product: empirical study in the Malaysian market", *Asia Pacific Journal of Marketing and Logistics*, Vol. 29 No. 4, pp. 837-853.

Appendix

Table A1.
Item generated from interview and purified based on content validity

Construct and definition	Preliminary items generated	Items modified and retained based on experts' suggestion
Greenwash in the sustainable property development (GSPD) Greenwash is property developers' acts of misleading consumers using their marketing strategy (e.g. advertisement) by overstating claims of sustainability and environmental benefits in order to secure the sales	1. XYZ company uses misleading words in the ad to show that they care for the environment	Retained
	2. XYZ company misleads its consumers by using visual artist's impressions with green to sell houses	Retained
	3. What XYZ company claims in its ads on green, is impossible to do	Retained
	4. XYZ company being environmental friendly claim is just to satisfy the local authority requirement (e.g. MPKj, MPPJ, MPSJ, DBKL, MPAJ)	Retained
	5. XYZ company's environmentally friendly claim in its ad is usually fake	Retained
	6. XYZ company's environmental claim in their advertisement is just to fulfil government's policy requirement	Retained
	7. XYZ housing developer exaggerates environmental and sustainable functionality of the housing products	Retained
	8. XYZ being environmental friendly claim is just to satisfy the authority Requirement	Suggested to delete
	9. XYZ environmental claim in their advertisement is just to fulfil government's policy requirement	Suggested to delete
	10. XYZ company's green features in the advertisements are vague	Retained
	11. What XYZ company claim in their advertisements on green is impossible to do	Suggested to delete
	12. I think XYZ company is faking on environmental benefits to sell houses	Retained
	13. XYZ housing developers environmentally friendly claim in advertisement are usually fake	Suggested to delete
	14. XYZ environmentally friendly advertisements are always true	Suggested to delete
	15. XYZ company's environmentally friendly advertisements are mostly false	Retained
	16. Going green is a common word used to sell properties	Retained
	17. XYZ company uses word like "environmental protection" in its ad to cheat people	Retained
	18. XYZ use words like environmentally caring in their sales advertisements	Suggested to delete
	19. I think the XYZ company is lying when they sell sustainable green homes	Suggested to delete
	20. XYZ housing developer over use sustainability and environmental protection terms to sell their homes	Suggested to delete
	21. XYZ company overstates environmental and sustainable functionality of its housing products	Retained
	22. XYZ housing developer advertisement use misleading words to show that they care for the environment	Suggested to delete
	23. XYZ company's green features do not attract me	Suggested to delete

(*continued*)

Table A1.

Construct and definition	Preliminary items generated	Items modified and retained based on experts' suggestion
	24. XYZ company uses green concept in its advertisements without actually providing it	Retained
	25. Green features, sustainability and environmental protection are words commonly used in XYZ company advertisements to attract buyers	Suggested to delete
	26. I think XYZ company is only telling half true in their advertisements	Retained
	27. Green, nature and environment are the most misused words in XYZ company's advertisement	Retained
	28. XYZ company knows that nobody can check on its fake environmental claim	Retained
	29. XYZ makes fake environmental advertisement to sell houses	Suggested to delete
	30. XYZ company cheat people by making fake environmentally friendly claims	Suggested to delete
	31. XYZ housing developer like to fake green advertisements to sell houses	Suggested to delete
	32. XYZ company is faking to be environmentally caring	Suggested to delete
	33. XYZ always delivers what they promised in their advertisements	Suggested to delete
	34. XYZ company delivers what they promised in their advertisements	Retained
	35. Artist impressions are used to make me believe the house is with green features	Suggested to delete
	36. I do not believe the green visual shown by XYZ in their Advertisements	Suggested to delete
	37. XYZ thinks doing nice landscape is already Environmentally friendly	Suggested to delete
	38. Green is just a concept that XYZ housing developer use to secure sales	Suggested to delete
	39. XYZ housing developer leave out or mask important information to make environmentally sustainable homes sound better than it is	Suggested to delete
	40. XYZ housing developer claim to produce environmentally sustainable homes which usually cannot be accomplished	Retained
	41. XYZ company uses misleading visual and/or graphics in the ad to show that it cares for the environment	Retained
	42. XYZ company over claims its environmental benefits	Retained
	43. It is easy for XYZ company to mislead its customers to sale its products by using green ad	Retained
	44. I do not care even if the XYZ company's environmental Advertisements is not true	Suggested to delete
	45. Nobody cares about what XYZ advertised about its green features	Suggested to delete
	46. Nobody cares about what XYZ advertised about the environment	Suggested to delete
	47. XYZ company is lying about environmental protection	Suggested to delete
	48. XYZ under claim their environmental benefits	Suggested to delete
	49. The green visuals shown during sales are usually not delivered	Suggested to delete
	50. XYZ does not deliver the environment that they promise in their advertisements	Suggested to delete
	51. XYZ housing developers mislead consumers in their advertisements	Suggested to delete
	52. Government do not care if XYZ company cheat in their green advertising	Suggested to delete
	53. I am not convinced by the XYZ company's environmental advertisements	Retained
	54. I do not know how to check XYZ green benefits stated in their advertisements	Suggested to delete
	55. I will buy houses with environmentally friendly features specified in the advertisement	Suggested to delete
	56. XYZ company's advertisements' visual effects are usually artists' impressions which cannot be built	Retained
	57. There is no one who can verify sustainability claim by XYZ company	Retained
	58. Green sustainable houses can never exist	Suggested to delete
	59. People like residential housing property that claims to be sustainable without knowing the actual benefits	Suggested to delete

Note(s): Brand XYZ refers to the property developer

Greenwash in the sustainable property development (GSPD)	
False claims	1. XYZ company uses word like "environmental protection" in its ad to cheat people
	2. XYZ company overstates environmental and sustainable functionality of its housing products
	3. What XYZ company claims in its ads on green is impossible to do
	4. I think XYZ company is faking on environmental benefits to sell houses
	5. XYZ company over claims its environmental benefits
	6. XYZ company's green features in the advertisements is vague
Misleading information	1. XYZ company uses misleading words in the ad to show that it care for the environment
	2. XYZ company misleads its consumers by using visual artist's impressions with green to sell houses
	3. It is easy for XYZ company to mislead its customers to sale its products by using green ad
	4. XYZ company uses misleading visual and/or graphics in the ad to show that it cares for the environment

Table A2.
Finalized items of greenwash in the sustainable property development

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