

**Green information quality and green brand evaluation: the moderating effects of eco-label credibility and consumer knowledge**

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**ABSTRACT**

*Purpose:* This study examines the effects of three green information quality dimensions - persuasiveness, completeness and credibility - on green brand evaluation and whether this is mediated by green brand credibility. It also examines the moderating effects of eco-label credibility and consumer knowledge on the green information quality dimensions and green brand credibility relationships.

*Design/methodology/approach:* Using a structured questionnaire examining environmentally-friendly electrical goods/electronics, cosmetic and apparel product advertisements, involving an elaboration task, this study collected usable data from 1,282 Indian consumers across 50 cities. It also undertook an assessment of three different product groups using structural equation modelling to examine the proposed hypotheses and assessed moderated mediation using the Hays process model.

*Findings:* The study indicates that: (i) green brand credibility mediates the effects of green information quality dimensions on green brand evaluation; (ii) consumer knowledge moderates

the effects of persuasiveness and completeness on green brand credibility; and (iii) eco-label credibility moderates the effects of persuasiveness and credibility on green brand credibility.

*Research limitations/implications:* This study supports the relevance of Elaboration Likelihood Model and the mediation effect of green brand credibility when processing green information. It also presents evidence that credible eco-labels enhance green information processing. While the results are broadly consistent across the three product categories, the results may only be generalizable to the environmentally-aware urban populations.

*Practical implications:* To help brand managers to design advertisements that add brand credibility in environmentally-aware urban markets.

*Originality/value:* It helps to define green information quality, and the interacting effects of eco-label credibility and consumer knowledge in green information processing.

**Keywords:** green advertisements; green information quality; consumer knowledge; eco-label credibility; green brand credibility; green brand evaluation

## **Introduction**

Green claims in advertising are often criticised for limitations in providing unbiased, accurate and believable information about green brands (Leonidou *et al.*, 2011; Matthes and Wonneberger, 2014; Xie and Kronrod, 2012). Such information is critical for effectively communicating with targeted consumers. Green product information needs to be clear and meaningful to assist with consumer evaluations (Usrey *et al.*, 2020), and many such companies seek methods to enhance information quality for favourable consumer assessments of their green brands (Matthes and Wonneberger, 2014; Schmuck *et al.*, 2018). This highlights the need for marketers to understand the information quality associated with green advertisement information, the definition of green information quality and its dimensions in green advertising context, differences across the dimensions of green information quality, and their effects on consumer assessments of green brands. As marketers struggle to motivate consumers to positively assess green brands and improve consumer willingness to purchase green brands (Pelsmacker and Janssens, 2007), enhancing consumers' perceptions of green information is critical. This is especially important as consumers are being bombarded with an increasing amount of product information, all of which influences information quality. Thus, enhancing quality of green claims may influence consumer perceptions towards goods with environmental attributes and their purchase likelihood.

Former green advertising research has focused on green information quality, defined as consumer-perceived usefulness of green information (Keller and Staelin, 1987). This includes identification of its critical role in generating favourable consumer perceptions (Matthes and Wonneberger, 2014) and encouraging sustainable consumption behaviour (de Pelsmacker and Janssens, 2007). Many marketers have sought to make green information believable (Chang,

2011; Ganz and Grimes, 2018), including via alternative/tailored content for specific product types or consumer segments (Chan and Lau, 2004; Matthes *et al.*, 2014; Tucker *et al.*, 2012). Green advertisements have been known to use a range of persuasion cues (Kumar, 2017; Leonidou *et al.*, 2011), to help to improve green ad persuasiveness (Bickart and Ruth, 2012). More specific and complete information can enhance consumer communications, including making them more likely to believe green advertisements (Atkinson and Rosenthal, 2014; Kareklas *et al.*, 2014; Xie and Kronrod, 2012). Yet while former studies have identified such green information characteristics, there has been a lack of clearly defined information quality definitions within the green context. This study has subsequently uncovered that green advertisement information should be *complete*, *persuasive* and *credible* – these have been defined as the core green informational quality dimensions.

Consumers use information quality when they interpret information in advertisements, they either assess information within the advertisement's content (Matthes *et al.*, 2014) or they refer to other information (such as eco-labels) from other sources that help them to assess advertisement information (Bickart and Ruth, 2012). Either of these methods for information assessment affects consumer attitude and behavioural intentions (e.g. Matthes *et al.*, 2014), which is aligned with Elaboration Likelihood Model (ELM) that involves two routes of information processing - central and peripheral - to impact consumer attitude (Petty and Cacioppo, 1983). Along the central route, consumers allocate cognitive resources to advertisements' information to process the ads and make judgments, while the peripheral route involves information processing via cues indirectly linked to advertisements' information. In this study, we have used ELM as theoretical grounding to hypothesize and empirically assess the relevance of the central route and peripheral route in shaping consumer assessment of green brands. This study explored information quality dimensions as central route to information

processing, eco-label credibility as peripheral route to information processing and moderating effect of consumer knowledge. The study examined the effects of these variables on brand credibility/evaluation, which is justified in the following discussion and proposed framework of this study.

Prior studies have examined how green advertisements shape consumer attitudes toward such ads (e.g. Tucker *et al.*, 2012), including the advertised brands (e.g. Chang, 2011; Matthes *et al.*, 2014), and how these influence their purchase intentions (Mo *et al.*, 2018). When assessing the greenness of products, consumers need to trust the information provided; that the brand is credible and delivers on its promises (Chen and Chang, 2013; Erdem and Swait, 1998). This can influence consumers' quality perceptions as well as purchase decisions (Baek and King, 2011; Nayeem *et al.*, 2019). Yet despite its apparent relevance for generating consumers' green brand responses (Chen, 2010), brand credibility in the green advertising context has been relatively unexplored. This study addresses this gap by examining whether green brand credibility has a mediating effect on the relationship between green information quality and green brand evaluation [defined as consumer-perceived product quality and likelihood to buy green brands (Keller and Aaker, 1992)]. In applying the ELM, this study has assessed green brand credibility and green brand evaluation as outcome variables in green information processing. Given that trust is crucial to green consumers (Matthes and Wonneberger, 2014), this study has anticipated that the mediating effect would be stronger than the direct effect.

For ELM, this study proposed consumer perceptions of eco-label credibility as peripheral route to information processing and examined its effects in central route to information processing of green advertisements, based on marketers often using them to enhance green information credibility (Cummins *et al.*, 2014; Xie and Kronrod, 2012) and consumer preference for

products with eco-labels (Bickart and Ruth, 2012; Kwon *et al.*, 2016). Eco-labels have been known to enhance consumer responses to both green advertisements and brands (e.g. Atkinson and Rosenthal, 2014; Bickart and Ruth, 2012; Schmuck *et al.*, 2018), viewing them as objective endorsements of products' environmental information (Dean and Biswas, 2001; Thøgersen *et al.*, 2010). Such trust in eco-labels also makes the information search less complex (D'Souza *et al.*, 2007) and can improve consumer decision-making (Bickart and Ruth, 2012). Although the multitude of eco-labels in use means that consumers should believe eco-labels in order to effectively differentiate between alternative green brands (Atkinson and Rosenthal, 2014; Bickart and Ruth, 2012; Usrey *et al.*, 2020). This increases the importance of eco-label credibility [defined as consumer-perceiving eco-labels to certify the product's environmental impact (Goldsmith *et al.*, 2000)]. Despite its importance, the effects of eco-label credibility on processing of green advertisement information has been relatively unexplored. This study has therefore examined whether the green information quality dimensions have a greater impact on green brand credibility for more credible eco-labels, including those green advertisements where eco-labelling is mandatory. This also responds to Atkinson and Rosenthal's (2014) call to explore consumer reactions to eco-labels in real market advertisements rather than hypothetical advertisements, including their effectiveness in processing such information.

Information processing is dependent upon consumers' route selection, which depends on their involvement level; their ability or motivation to engage in effortful information processing (Petty and Cacioppo, 1983). In high-involvement conditions, consumers are more likely to thoughtfully process information via central cues, while consumers under low-involvement conditions are more likely to use peripheral cues. So, this study has also examined the effects of consumer knowledge [defined as consumers' existing knowledge of green products and eco-labels (Alba and Hutchinson, 2000)] on information processing of green advertisements, as this

can influence their processing of green advertising information (Hong and Sternthal, 2010; Rao and Monroe, 1988). Consumers often use their product-related environmental knowledge to evaluate advertising content (Royne *et al.*, 2012). Green product information is also often conveyed in a highly specialised format (e.g. energy stars for white goods), requiring consumer environmental knowledge to enable information processing. Thus, this study has anticipated that consumers' responses toward green brands will differ based on their level of environmental knowledge. This aligns with Thøgersen *et al.* (2012) indicating that such consumer decision-making may vary across different environmental knowledge levels, as well as Schmuck *et al.*'s (2018) recommendation to more thoroughly examine consumer responses where product evaluations require higher knowledge (i.e. high-involvement products). This study has therefore examined whether green information quality dimensions have stronger effects on green brand credibility among high-knowledge than low-knowledge consumers.

Prior green advertising studies have found that most consumers follow a systematic route of information processing to judge green messaging (Matthes and Wonneberger, 2014), including credibility (Tucker *et al.*, 2012). Thus, this study used the ELM where green information quality dimensions were deemed the central route, eco-label credibility the peripheral route, and consumer knowledge<sup>1</sup> as involvement, to assess their effects on green brand credibility and evaluation (see Research framework in Figure 1). The study has examined field data collected from 1,282 consumers involving assessing the relationships for three product categories - electrical goods/electronics, cosmetics and apparel - to assess the generalisability of the above effects. The rationale for applying these product categories was that a large number of earlier green advertising studies have focused on low-involvement products (e.g. Bickart and Ruth,

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<sup>1</sup> Petty *et al.* (1983) highlighted consumer knowledge as an important moderator of the route to persuasion, and Cyr *et al.* (2018) used it to assess involvement.

2012; Matthes *et al.*, 2014; Mo *et al.*, 2018; Schmuck *et al.*, 2018; Tucker *et al.*, 2012); thereby providing compelling reasons for this study examining high-involvement and low-involvement product categories, allowing an assessment of the generalizability of results.

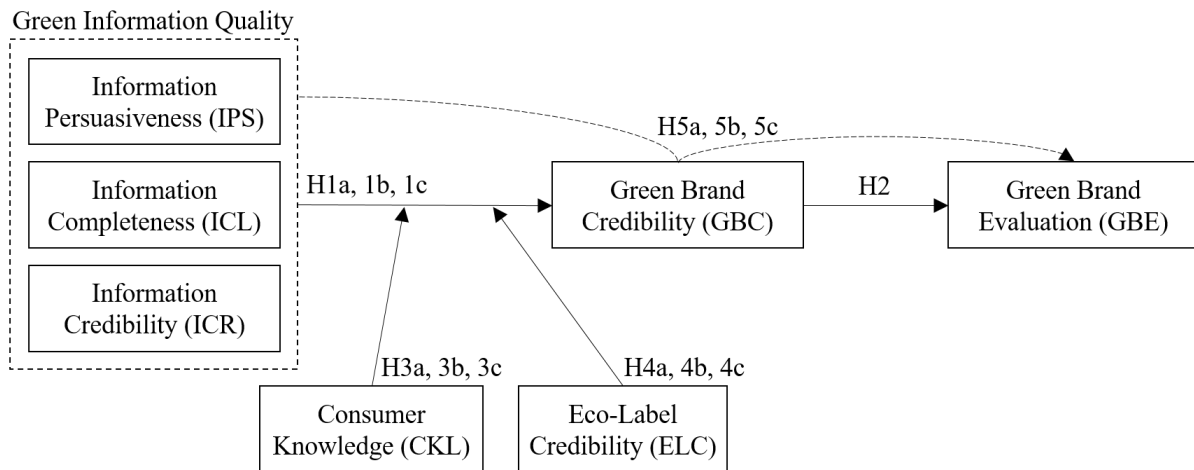


Figure 1: Research framework

This study makes four contributions. Firstly, this study answers calls to better understand how to communicate green claims to consumers (Matthes, 2019) and defines green information quality with three dimensions - information persuasiveness, information completeness and information credibility. Secondly, this study offers support to the Elaboration Likelihood Model of information processing in the green advertising context. Specifically, this study identifies effects of green information quality dimensions on green brand credibility that supports central route to information processing. This study identifies the effects of consumer knowledge in delineating the influence of green information quality dimensions on green brand credibility, which confirms the moderating effects of consumer involvement (i.e. consumer knowledge in this study) for the central route, thereby affecting consumer judgments. However, this study does not provide support for the effects of peripheral cues on consumer judgments in advertisement information processing. Thirdly, this study identifies mediating effect of green



brand credibility in the relationships between green information quality dimensions and green brand evaluation that supports extant literature on mediating effect of the credibility construct. Fourth, this study examines all of the hypothesized relationships across three product categories that support the generalization of the findings.

## **Hypotheses development**

### ***Green information quality***

Information quality was conceptualized in the information science literature (Nicolaou and McKnight, 2006), with marketing and advertising studies adopting it to assess content and message quality (Nam *et al.*, 2019; Zhang and Du, 2020). In line with these past works, this study has defined green information quality as consumer-perceived usefulness of green brand information, where content is perceived as complete, persuasive and credible (Keller and Staelin, 1987). Most green brand advertisements seek to inform consumers about particular characteristics, such as environmentally-friendly attributes and environmental benefits (Leonidou *et al.*, 2011). Consumers then process this information to assess product quality, to help them to compare products (Meise *et al.*, 2014). For ELM, green information quality serves as central route to information processing and positively influences consumer responses towards advertisements and brands (Matthes *et al.*, 2014). High information quality in advertisements improves consumers' product/brand perceptions and assists in decision-making (de Pelsmacker and Janssens, 2007; Kao and Du, 2020; Keller and Staelin, 1987).

In a green marketing context, some studies have defined information quality as a unidimensional construct (de Pelsmacker and Janssens, 2007; Wu and Cheng, 2018). Other studies have described information quality as a four-dimensional (Wang and Strong, 1996) or

a two-dimensional construct (e.g. Zheng *et al.*, 2013). The multi-dimensional approach is based on the view that one dimension may not capture the complexity of information quality, with different dimensions having divergent effects on consumer assessments (Law *et al.*, 1998). This study therefore defined green information quality as a three-dimensional construct comprising completeness, persuasiveness and credibility. Information persuasiveness is the extent consumers perceive information to be reasonable and convincing (Chandran and Menon, 2004), complete information is based on whether consumers perceive the information to be sufficient for their purpose (Wang and Strong, 1996), and information credibility relates to the extent consumers perceive information to be believable, true and unbiased (MacKenzie and Lutz, 1989). The following sections discuss how the relationships between green information quality dimensions and green brand credibility/evaluation follow the central route to information processing.

### ***Information persuasiveness and green brand credibility***

Most consumers prefer persuasive advertisements (Macinnis and Jaworski, 1989), which is why marketers often use such cues for each target segment(s). Information persuasiveness has been found to induce positive emotions (Debono, 1992), and can affect whether consumers accurately assess the information (Bodenhausen *et al.*, 2001; Cohen *et al.*, 2008). Consumers pay more attention to persuasive information and expand on cognitive brand perceptions (Lee *et al.*, 2006), which results in better information absorption (Lee *et al.*, 2006) and synthesis (Dijkstra, 2008). Persuasive information can also improve consumer brand awareness and knowledge (Tormala and Petty, 2007), leading to higher levels of trust and belief in the brands (Friestad and Wright, 1995). In green advertisements, persuasive information cues can influence consumer attitudes toward brands (Bickart and Ruth, 2012; Schmuck *et al.*, 2018). This study therefore suggests that when consumers are provided with persuasive green

advertisement information, they better understand the brand, and have confidence in its environmental claims and competence. It is therefore proposed in this study that:

H1a: Information persuasiveness positively affects green brand credibility.

### ***Information completeness and green brand credibility***

Complete information has been deemed critical for consumer decision-making (Huber and McCann, 1982; Johnson and Levin, 1985; Nylén, 1990). Missing or incomplete information adds uncertainty (Jagacinski, 1991), negatively affects product evaluation (Johnson and Levin, 1985) and consumer choices (Kivetz and Simonson, 2000), whereas complete information is more likely to increase trust (Moorman *et al.*, 1993). In a green brand context, consumers have been known to choose non-green products with complete information over green alternatives with incomplete information (Simpson and Radford, 2014). This indicates that green advertisements with complete information can positively influence consumer believability of green brands' environmental claims and competence. It is therefore proposed in this study that:

H1b: Information completeness positively affects green brand credibility.

### ***Information credibility and green brand credibility***

Most consumers seek out honest and trustworthy information to help make informed decisions. When consumers perceive information to be trustworthy, it is determined as more legitimate, useful and acceptable (Erkan and Evans, 2016; Etter *et al.*, 2018; Sussman and Siegal, 2003), and enhances consumer confidence in the product/brand and its claims (Prendergast *et al.*, 2010). This furthers the opportunity for brands to build trusting relationships (Xu *et al.*, 2018) and ensures brands are included in consumers' consideration sets (Kim and Choi, 2016).

Among green brands, credible information means that consumers will believe the greenness claims (Kwon *et al.*, 2016) and are more likely to develop positive, favorable brand emotions (Bickart and Ruth, 2012). Green product information perceived as biased or exaggerated may lead to negative product evaluations among consumers (Chang, 2011). Thus, based on the assumption that credible advertisement information is more likely to make consumers believe green brands' environmental claims and competence, it is proposed in this study that:

H1c: Information credibility positively affects green brand credibility.

### ***Green brand credibility and green brand evaluation***

Brand credibility is an important antecedent to consumer attitude, including consumer-perceived brand utility and value (Baek *et al.*, 2010; Bhatt *et al.*, 2013; Erdem *et al.*, 2002; Spry *et al.*, 2011). Brand credibility can reduce consumers' information searching and processing efforts, as well as can diminish the cognitive efforts required to evaluate brands (Erdem and Swait, 1998). Such credibility has been known to help consumers differentiate brands from their competitors (Erdem *et al.*, 2006). Consumers consequently feel confident about the brand attributes, which improves their decision-making efficiency (Baek and King, 2011; Erdem *et al.*, 2006; Erdem and Swait, 2004). Thus, this study proposes that:

H2: Green brand credibility positively affects green brand evaluation.

### ***Moderation effects of consumer knowledge***

Consumer knowledge has been found to affect consumers' assessments and responses to advertising. Prior studies have found that high-knowledge consumers have higher information-processing ability than low-knowledge consumers (Chu *et al.*, 2019; Hong and Sternthal,

2010), mostly because they are more open to learning about new information (Poynor and Wood, 2010). High-knowledge consumers are recognized as more focused and confident, and less confused (Mazursky and Vinitzky, 2005). That is, they are better able to compare offerings, to develop an appropriate understanding of the differences in green products, including their characteristics and products' eco-labels (Bian *et al.*, 2016). In contrast with low-knowledge consumers, their product/brand evaluation processes and decisions are more simplified (Chebat *et al.*, 2001; Kim and Park, 2011; Polonsky *et al.*, 2012). For ELM, consumer knowledge (that represents consumer involvement within this study) and varying levels of knowledge determine the selection of central and peripheral routes to information processing (Petty and Cacioppo, 1983). It is proposed that high-knowledge consumers choose central route of green information processing. Anticipating that consumers' divergent responses to advertising information quality are based on differing knowledge levels, with high-knowledge consumers less accepting of low-quality information that can reduce green brand credibility, this study proposes that:

H3. Each of the three green information quality dimensions (a. persuasiveness, b. completeness and c. credibility) has a greater effect on green brand credibility among high-knowledge compared with low-knowledge consumers.

#### ***Moderation effects of eco-label credibility***

Prior studies have found credibility to affect consumers' assessments and responses to information. For instance, when a credible information source communicates persuasive messages, it has been known to enhance consumer attitudes (Tormala and Petty, 2004). Similarly, when a credible information source provided climate change information, the risk perceptions of climate change were consequently higher (Dong *et al.*, 2018). Thus, information

source credibility moderated the relationships. Such research findings suggest that in the context of green brands, highly persuasive information in the presence of a highly credible eco-label may have a stronger effect on green brand credibility as compared to a low-credible eco-label. They also indicate that complete as well as credible information in presence of a highly credible eco-label may have stronger impact. It is proposed that eco-label credibility (that is a peripheral route to information processing) enhances the effects of central cues (i.e. green information quality dimensions) on green brand credibility. Thus, it is proposed in this study that:

H4. Each of the three green information quality dimensions (a. persuasiveness, b. completeness and c. credibility) has a higher effect on green brand credibility for highly credible eco-labels compared with low credibility eco-labels.

#### ***Mediation effects of green brand credibility***

Prior studies have presented strong evidence of the mediating role of credibility in the communication-persuasion relationship (Crowley and Hoyer, 1994; Hilton, 1995; Lacznik *et al.*, 2001). The underlying mechanism of brand credibility is the comparison between what brands claim and how they perform (Herbig and Milewicz, 1993). When consumers are exposed to brands, they assess their trustworthiness and ability to deliver on their promises, which shapes their brand perceptions. Thus, brand credibility enhances the effect of brand experience on brand perceptions (Nayeem *et al.*, 2019). Similarly, when consumers obtain brand information, they use their perceptions of brand credibility to evaluate how it affects their decision-making (Aaker and Keller, 1990; Dabbous and Barakat, 2020). These studies indicate mediation effect of brand credibility in information processing.

Consumers often possess higher levels of trust and acceptance of more credible brands, as well as higher brand quality perceptions, which can reduce their uncertainty about purchasing them (Baek and King, 2011; Baek *et al.*, 2010). It was therefore determined that when consumers process green ad information that reinforces their brand credibility perceptions, those that experience higher green information quality will form more positive brand evaluation. In contrast, if green ad information does not reinforce consumers' brand credibility perceptions, there will be a lower effect of green information quality on consumer brand evaluation. It was therefore proposed in this study that:

H5: Green brand credibility positively mediates the effect of green information quality (a. information completeness, b. information persuasiveness and c. information credibility) on green brand evaluation.

## **Methodology**

### ***Elaboration technique***

Many of the green advertisement studies use experiments (e.g. Bickart and Ruth, 2012) that are designed to be realistic, but they often lack external validity, as they are not based on actual product purchase decisions (Winer, 1999), or the product claims may not be salient to the consumer. In other studies, where consumers have been surveyed on their general purchasing behaviour of green products, there have been issues with consumers recalling a diverse set of products (e.g. limited recall accuracy, based on time lapse between the past behaviour and survey response). One research approach that has been used to overcome such issues is for consumers to not only recall past experiences, but to elaborate on this experience by writing down a description of it (Riessman, 1990). Such elaboration techniques are used explicitly to

enhance recall (Edvardsson and Roos, 2001), and to generate focused (rather than random) responses (Keaveney, 1995). They have often been used across a wide range of studies, including critical service failure incidents (McCull-Kennedy *et al.*, 2009) and unethical marketing behaviour (Ingram *et al.*, 2005).

In line with this, this study asked respondents to: a) recall any advertisement containing a green claim that they had seen across a cross-section of products; and b) write down a description (i.e. elaborate) of the advertisement and the green claim. Such an approach has also been applied in other branding/advertising research (Pullig *et al.*, 2006; Yu *et al.*, 2020), primarily to overcome any negative effects of recall ‘fading’ over time (Bagozzi and Silk, 1983). See Appendix 1 for a list of the brands and representative quotes relating to products’ environmental characteristics. The results in the Appendix highlight that this elaboration technique helped this study’s respondents to recall their actual experiences. While all of the comments originally suggested might not always be considered purely environmental, consumers often interpret a wide range of product information as being environmentally focused (Polonsky *et al.*, 2002). Rather than seek to interpret respondents’ meanings, we only included attributes that were clearly environmentally focused. For example, one comment on electrical goods was “boots in less time” which could suggest some environmental savings, however this may also infer a better product attribute on its own. Thus, such potentially ambiguous comments were omitted.

Each of the 1,282 useable respondents identified a brand that was promoted on environmental attributes and listed at least one environmental attribute for each and thus all brands listed are classified as being green. In the coding process, we summarized all the attributes raised. In most instances, respondents identified multiple product attributes (mean 2.8 attributes), where



on average 2.1 were environmentally focused and 0.7 were not environmentally focused. All respondents identified at least one green attribute. We have listed the green attributes only in Appendix 1. Useable respondents also identified a range of eco-labels, which are reported by product category in Appendix 1 and each eco-label is described in more detail in Appendix 2.

### ***Selection of product category***

Researchers have identified that consumers evaluate various environmental products differently (Barbarossa and de Pelsmacker, 2016; de Pelsmacker and Janssens, 2007; Thøgersen *et al.*, 2012), which is one probable reason equivocal results arise in relationships across studies. This suggests examining relationships across multiple product categories is important to assess the generalizability of results and relationships. In terms of the products assessed in this study, there were three categories: electrical goods/electronics (lightbulbs, televisions, air-conditioners, refrigerators, laptops and washing machines), cosmetics (facewash, body-wash, moisturiser, skin cream, after-shave lotion and shaving cream) and apparel. Prior green product studies have also examined these product categories, such as Chan and Lau (2004) and Chen and Chang (2013) for electrical goods/electronics, Kim and Chung (2011) and Pudaruth *et al.* (2015) for cosmetics and Momberg *et al.* (2012) and Park and Lin (2020) for apparel. This study was undertaken in India, where the Indian Government has an official eco-label named 'eco-mark', which is used in these (and other) product categories and is widely promoted in India (Thomsen and McAloone, 2015). This includes national and multinational environmentally-friendly brands in India. With Indian consumers sensitive about environmental impacts increasing (i.e. Jaiswal and Pant, 2018; Kumar and Ghodeswar, 2015; Panda *et al.*, 2020), it was also important to focus on product categories that they regularly consume. The model was also run on three separate product groups, similar to looking at

different cultural or national groups (e.g., Kawakami *et al.*, 2012; Singh *et al.*, 2008), to allow a comparison of results to assess for generalizability.

### ***Sample***

This study employed a targeted convenience sampling method. The convenience sampling method has often been used in green consumption studies (Atkinson and Rosenthal, 2014; Kao and Du, 2020; Pudaruth *et al.*, 2015; Yadav, 2016). We recruited consumers who had an understanding and active interest in the research domain (Willems *et al.*, 2019), that is environmental goods.

The study was conducted among Indian consumers in the country's 50 largest major consumption hubs - eight traditional metros with average population of 67 million and per capita income in 2020 of 371,000 INR (i.e. ~4,870 USD /~4,330 Euro), and 42 new wave cities with average population of 69 million and per capita income in 2020 of 217,000 INR (i.e. ~2,845 USD /~2,530 Euro). These consumers generally have higher levels of media consumption and substantial purchasing power (Balsara *et al.*, 2017), and were deemed in this study as reflective of urban middle-class Indian consumers.

The data was collected over a five-month period by a team of trained assistants, with 4,000 consumers approached outside shopping malls (n=3,081) and at pro-environmental events (n=919). There were 2,571 consumers that either declined to participate or could not identify a green good within the product categories. Overall, 1,429 consumers (994 at shopping malls and 435 at events) participated in the study, representing a 35.73% response rate. From this, there were 1,282 useable responses, with 98 excluded because they were unable to elaborate on the green product (this includes those who did not identify at least one environmental

attribute of green brands and one eco-label) and another 49 excluded because of static or replicated response patterns. Of the 1,282 useable responses, 498 respondents identified an electrical goods/electronics product containing a green claim (101 of these identified a lightbulb), 442 identified a cosmetic product, and 342 an apparel product. Each of the 1,282 useable responses included green products/brands and respondents identified at least one environmental attribute of the brands which ensured that only green brands were assessed.

Table I below reports on the demographic characteristics of the sample. It shows that the average age was 35.42 years and that more than half of the sample had a postgraduate degree or above. India's Census (2011) data and recent industry reports (Ojha and Ingilizian, 2019) indicate that this sample is reflective of the urban middle-class Indian society who are younger and highly educated (e.g. Jaiswal and Pant, 2018; Yadav, 2016), as well as spend on essential categories (e.g. personal care and apparel), and have a high ownership of durables.

----- Insert Table I here -----

### ***Survey instrument***

The questionnaire had four sections. The first explained the purpose of the survey and sought respondent consent, and the second asked respondents to identify a product category where they had seen an advertisement with a green claim. Respondents were then asked to identify the brand, to provide an open narrative of the advertisement and to identify the environmental claim. The respondents were asked to: (i) provide the brand name; (ii) describe the narrative; (iii) describe the brand's environmental benefits as claimed in the ad; (iv) provide information about the eco-label (e.g. shape, letters); and (v) identify the benefits promoted by the eco-label.

The third section included the items of all the measures, with instructions that assured respondents there were no ‘correct’ answers. The following existing scales were adapted for the constructs used in this study: Zhang’s (1996) four-item scale for information completeness (ICL); MacKenzie and Lutz’s (1989) three-item scale for information credibility (ICR); six-item scale from McKinney *et al.* (2002) and Yang *et al.* (2005) for information persuasiveness (IPS); Moussa and Touzani’s (2008) six-item for eco-label credibility (ELC); Erdem and Swait’s (2004) six-item scale for green brand credibility (GBC); and Keller and Aaker’s (1992) three-item scale for green brand evaluation (GBE). The scale for consumer knowledge (CKL) consisted of five items for past experience, familiarity and expertise (Flynn and Goldsmith, 1999; Kerstetter and Cho, 2004; Verbeke and Vackier, 2005).

Each item was measured on a seven-point Likert scale anchored by “1=completely disagree” and “7=completely agree”. A single item marker variable was also included in this section - “To what extent are your neighbours important to you?” measured on a seven-point Likert scale anchored by “1=least important” and “7=most important”, which was used to test common method bias (CMB) (Lindell and Whitney, 2001).

The fourth section was used to gather demographic information as well as included a thank you to the respondents. Each of them received an incentive (a discount coupon for a retail store) for completing the questionnaire, which on average took 20 minutes.

### ***Pre-testing and scale validation***

There were three stages to the pre-testing and scale validation. The first involved nine international academics assessing the survey items, the second a review of the materials by 58

potential respondents, and the third a subset of 101 respondents who responded to lightbulbs in the main data collection were used to assess the reliability of the constructs.

The information quality dimensions (i.e. persuasiveness, completeness and credibility) were first assessed by nine academic experts (well-published in information processing, who resided in three different continents). They supported adding credibility as a third dimension to information quality. This suggested scale was based on MacKenzie and Lutz's (1989) three-item scale and they determined it was appropriate and would not overlap with other two dimensions' items.

The questionnaire was further assessed using a sample of 58 respondents ( $M_{age}=27$  years, 48% females) who were asked to evaluate each item for ambiguity and clarity (for content validity), and to evaluate the questionnaire for overall structure and wording. Additional pre-testing steps (Churchill, 1979; Gerbing and Anderson, 1988) were undertaken to refine the three-dimensional, 13-items information quality scale.

To assess face validity, the sample of 58 pre-test respondents were then exposed to five print/video advertisements and were asked to complete the items for the three information quality dimensions for each advertisement. They were given 13 pre-printed Q-cards (one for each item of IPS, ICL and ICR) to rank them for persuasiveness from "most related" (rank=7) to "most unrelated" (rank=1) on a Q-sort template (Brown, 1993). They were allowed to rank more than one card, and were asked "Which of the terms on the cards, do you think, are related to persuasiveness?" This process was then repeated for completeness and credibility, which replicated the previous results.

Lastly, 101 respondents from the main sample<sup>2</sup> who identified lightbulbs as a product using a green claim were used as a validation sample, to assess the constructs. Exploratory factor analysis was conducted on the 33 items of the seven constructs in the research framework (see Figure 1). This identified seven components with an Eigen value more than 1, accounting for 71.12% of the total variance. Cronbach's alpha value for each component was more than 0.7, and all items within a component had item-to-total correlation of more than 0.5. The confirmatory factor analysis (CFA)<sup>3</sup> produced satisfactory results with goodness-of-fit indices of  $p=.00$ ; CMIN/DF=1.51; CFI=.96; GFI=.91; RMSEA=.04. For the seven constructs, average variance extracted (AVE) values above 0.5 indicated convergent validity (Hair *et al.*, 2006), and composite reliability (CR) exceeding the threshold of 0.7 confirmed discriminant validity (Bagozzi and Yi, 1988). These results were: information persuasiveness ( $\alpha=.89$ ; AVE=.52; CR=.71); information credibility ( $\alpha=.85$ ; AVE=.51; CR=.78); information completeness ( $\alpha=.91$ ; AVE=.56; CR=.79); green brand credibility ( $\alpha=.80$ ; AVE=.53; CR=.82); eco-label credibility ( $\alpha=.89$ ; AVE=.59; CR=.88); consumer knowledge ( $\alpha=.90$ ; AVE=.56; CR=.84); and green brand evaluation ( $\alpha=.81$ ; AVE=.60; CR=.74).

### ***Non-response bias assessments***

To assess non-response bias, the first 25% of the useable responses was compared to the last 25%, using a two-sample t-test (Armstrong and Overton, 1977). Results for each construct showed no statistically significant difference between the two groups ( $p>0.05$ ) (see Table II), suggesting an absence of non-response bias in the sample.

----- Insert Table II here -----

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<sup>2</sup> These were excluded from the main analysis.

<sup>3</sup> While this is recognized as a small sample for validation sample or pre-testing, such samples have been used in other pre-tests (Gagne and Hancock, 2006).

## Analysis and Results

### *Measurement model analyses*

Following Anderson and Gerbing's (1988) two-step approach, this study used structural equation modelling (SEM) to test the conceptual framework, via the 1,181 usable respondents (i.e. removing the 101 that assessed lightbulbs, as used in validation sample). The first step involved CFA (AMOS v20) to assess and validate the seven-factor measurement model. Goodness-of-fit indices ( $p=.00$ ; CMIN/DF=1.46; CFI=.98; GFI=.92; RMSEA=.04; AGFI=.82, IFI=.88; TLI=.93; SRMR=.06) show the data fits the model well. All the items of each construct were significantly loaded with factor loadings greater than 0.6 ( $p<.001$ ), ranging from .62 to .94 (Bagozzi and Yi, 1988). For each construct, Cronbach's alpha greater than 0.7 ensured internal consistency (Nunnally and Bernstein, 1994). CR greater than 0.6, AVE greater than 0.5 and shared variance between each pair of factors less than corresponding AVE ensured convergent and discriminant validity, respectively (Bagozzi and Yi, 1988) (see Table III). The discriminant validity was also tested using the Heterotrait-Monotrait ratio of correlations (HTMT) (Henseler *et al.*, 2015; Voorhees *et al.*, 2016), and these HTMT values varied between .13 and .52 for all pairs of constructs. These below the threshold of 0.85 (Henseler *et al.*, 2015) confirmed adequate equivalence of discriminant validity for all constructs. Table IV shows the descriptive statistics for each construct (where above the diagonal elements are the HTMT values and below are correlation values).

----- Insert Table III here -----

----- Insert Table IV here -----

### ***Common method bias***

This study undertook multiple ex-ante and ex-post methods to prevent CMB and test if it existed in the dataset (Chang *et al.*, 2010; LaPlaca *et al.*, 2018; Podsakoff *et al.*, 2003). For ex-ante approaches: (i) terms were used in the questionnaire familiar to the target respondents; (ii) instructions in the questionnaire were used to assure respondent of confidentiality and that there were no right/wrong answers; and (iii) items were grouped randomly but not construct-wise. These steps have been deemed as useful to mitigate socially desirable responses (Randall and Fernandes, 1991).

For ex-post approaches, Harman's single-factor test was used (Podsakoff *et al.*, 2003), which found that single factor was not extracted from the data. All the factors with an Eigen value of more than 1 accounted for 79.41% of the total variance, with factor 1 accounting for 18.39% (less than 50%) of the variance. Lindell and Whitney's (2001) suggestion of using a post-hoc marker variable was also used, with an item added to the questionnaire completely unrelated to all the constructs as: "To what extent are your neighbours important to you?" measured on a scale of 1 to 7 with "1=least important" and "7=most important". This item had the lowest correlation values out of all the variables in this study. During the SEM analysis, partial-correlation adjustments were made using the second smallest correlation among the study variables ( $r=.02$ ,  $p>.05$ ) (Malhotra *et al.*, 2006). A comparison between the original and adjusted correlations revealed that all significant zero-order correlations remained significant ( $p<.05$ ) after the partial-correlation adjustments were made. The common latent factor method was also used (Lindell and Whitney, 2001; Podsakoff *et al.*, 2003), involving the creation and inclusion of a common latent factor in the model. The CFA results showed that common method variance among all the exogenous variables was only 8%, which reduced to 1% after adding marker variable into the model. These results indicated that CMB was absent.



### *Structural model analyses*

As per the second step of Anderson and Gerbing's (1988) two-step approach, this study conducted full structural modelling on the sample (excluding the validation sample lightbulb respondents), using AMOS v20 and the Maximum Likelihood Method. This analysis showed good values for all goodness-of-fit indices where all standardised item loadings were greater than 0.6 and significant ( $p < .001$ ). The metric equivalence of the hypothesized model was also tested across the three samples (product categories). A comparison of the freely estimated and constrained model (gamma and beta equal for the three samples) showed no statistically significant differences in the path coefficients. The three samples were also combined to test the hypothesized paths, where a close fit was found ( $p = .00$ , CMIN/DF=1.53, CFI=.96, NFI=.92, GFI=.92, RMSEA=.04, IFI=.90; TLI=.96; SRMR=.07) with significant path coefficients for all of these hypothesized paths (see Table V below).

----- Insert Table V here -----

The results in Table V for the overall sample indicate that the effects of IPS, ICL and ICR on GBC were positive and significant, consistent with prior studies (e.g. Carlson *et al.*, 2018; Luo *et al.*, 2013). Thus, H<sub>1a</sub>, H<sub>1b</sub> and H<sub>1c</sub> were supported, confirming that persuasive, complete and credible information in green advertisements make green brands legitimate, trustworthy and competent. In contrast, when information in green advertisements is incomplete, unpersuasive and doubtful, it fails to leave credible brand impressions. The results for the overall sample also indicated that the effect of GBC on GBE was positive and significant (Table V), consistent with prior studies (e.g. Luo *et al.*, 2013; Rampl and Kenning, 2014). Thus, H<sub>2</sub> was supported, confirming that when consumers perceive green brands as credible, they positively evaluate green brands for their quality and superiority, and are more willing to purchase them.

*Additional analysis:* We re-ran the models including controls for age, gender and education and the inclusion of controls did not change the relationships in the model. In addition, prior studies have found relationships between ICL and ICR (Dutta-Bergman, 2004), and IPS and ICR (Xie *et al.*, 2011), and so, the effects of IPS and ICL on ICR were also examined in this study, via an additional SEM analysis. This structural model showed poor data fit (CFI=.57, GFI=.54, AGFI=.57; TLI=.56, RMSEA=.10), indicating that adding relationships between the components of informational quality reduces the effectiveness of the model.

### ***Moderating effects***

To examine the moderating effects, the Hayes' (2013) method via SPSS PROCESS MACRO with 5000 bootstrapped samples was used. To perform moderation, Spiller *et al.*'s (2013) floodlight/spotlight decision tree was followed. As the moderator variables in this study were continuous, with meaningful scale and focal values, spotlight analysis was performed rather than floodlight analysis (i.e. Johnson-Neyman technique). This was performed at one standard deviation above and below the mean of ELC/CKL, and independent, dependent and moderator variables were mean-centered to eliminate/reduce multicollinearity effects caused due to correlation between the variables (Aiken and West, 1991). To test the moderating effects of ELC and CKL, terms for direct effect of the independent variables (IPS, ICL and ICR), terms for direct effects of moderator variables (ELC and CKL) and interaction terms of the two variables were assessed. Where the interaction term was significant, this supported the moderation hypothesis (see Table VI). This process was first performed using the overall sample and then, for each of the three product categories.

----- Insert Table VI here -----

The results in Table VI for the overall sample indicate that CKL moderated the relationship between IPS and GBC ( $\beta=.24, p<.05$ ). The IPS-GBC relationship was stronger when CKL was higher (simple slope $=.29, t=1.97, p=.01$ ), whereas the relationship became negative for lower CKL (simple slope $=-.11, t=-.17, n.s.$ ). This suggests that when consumers are more knowledgeable, information persuasiveness has a stronger effect on green brand credibility as compared to less knowledgeable consumers. Thus, H<sub>3a</sub> was supported.

The results for the overall sample also found that CKL moderated the relationship between ICL and GBC ( $\beta=.19, p<0.001$ ). The ICL-GBC relationship was stronger when CKL was higher (simple slope $=.31, t=2.13, p=0.03$ ), whereas the relationship was weaker for lower CKL (simple slope $=-.22, t=-.19, n.s.$ ). This indicates that information completeness has a stronger effect on green brand credibility among more knowledgeable consumers as compared to less knowledgeable consumers. Thus, H<sub>3b</sub> was supported. The results for the overall sample also indicated that the interaction effect of ICR and CKL on GBC was not significant ( $\beta=.12, n.s.$ ), which meant that H<sub>3c</sub> was not supported.

The results for the overall sample also found that ELC moderated the relationship between IPS and GBC ( $\beta=.28, p<.05$ ). The IPS-GBC relationship was stronger when ELC was high (simple slope $=.32, t=2.16, p=.03$ ), whereas the relationship was weaker for low ELC (simple slope $=-.03, t=-.21, n.s.$ ). This suggests that for high-credibility eco-labels, information persuasiveness has a stronger effect on green brand credibility as compared to low-credibility eco-labels. Thus, H<sub>4a</sub> was supported. In contrast, the interaction effect of ICL and ELC on GBC for the overall sample was not found to be significant ( $\beta=.05, n.s.$ ), which meant that H<sub>4b</sub> was not supported.

The results for the overall sample also found that ELC moderated the relationship between ICR and GBC ( $\beta=.26, p<.05$ ). The ICR-GBC relationship was stronger when higher ELC was observed (simple slope $=.23, t=1.48, p=.05$ ), whereas the relationship was weaker when ELC was lower (simple slope $=-.02, t=.47, n.s.$ ). This indicates that information credibility has a stronger effect on green brand credibility among high-credibility eco-labels as compared to low-credible eco-labels. Thus, H<sub>4c</sub> was supported.

### ***Mediating effects***

The Hayes' (2013) method via SPSS PROCESS MACRO with 95% confidence interval (CI) and 5000 bootstrapped samples was used to analyze the mediation effects. This process was first performed using the overall sample and then, for each of the three product category samples. These results, as shown in Table VII below, revealed significant indirect effects ( $p<.05$ ) of GBC for the overall sample. For IPS, the indirect effect [(c' $=.31, 95\% CI=(.08-.18)$ ] was significant, which accounted for 15.34% of the variance in the IPS-GBE relationship. For ICL, the indirect effect [(c' $=.29, 95\% CI=(.07-.15)$ ] was significant, which accounted for 17.67% of the variance in the ICL-GBE relationship. For ICR, the indirect effect [(c' $=.20, 95\% CI=(.08-.17)$ ] was significant, which accounted for 16.01% of the variance in the ICR-GBE relationship. Thus, H<sub>5a</sub>, H<sub>5b</sub> and H<sub>5c</sub> were supported for the overall sample.

----- Insert Table VII here -----

### ***Comparison across product categories***

This study also investigated the direct, moderating and mediating relationships for each of the three product category samples and then evaluated the results within these three sub-samples to identify the generalizability of results. While this is different to a multi-group analysis, this

approach is also undertaken within the literature when comparing model results between groups (i.e. Iankova *et al.*, 2019; Li *et al.*, 2018; Kawakami *et al.*, 2012; Singh *et al.*, 2008).

To examine H1 and H2, we evaluated the structural equation model for each product categories (similar to that for the overall sample). Good model fit was found for each product category [electrical goods/electronics - ( $p=.00$ , CMIN/DF=1.02, CFI=.95, NFI=.91, GFI=.93, RMSEA=.03, IFI=.89; TLI=.95; SRMR=.05), cosmetics - ( $p=.00$ , CMIN/DF=1.19, CFI=.96, NFI=.93, GFI=.91, RMSEA=.05, IFI=.91; TLI=.96; SRMR=.06), and apparel - ( $p=.00$ , CMIN/DF=1.40, CFI=.95, NFI=.90, GFI=.91, RMSEA=.04, IFI=.92; TLI=.96; SRMR=.05)]. For each product category, we report the Beta values in the Table V alongside the overall sample Beta values. The hypotheses were assessed in regard to the significance of each hypothesis for each product category. The results of each of the product-based models were similar to overall sample results. Thus, the results of all direct hypotheses (H1a, H1b, H1c and H2) identified relationships that were positive and significant for each product category (see Table V).

Similar to that for the overall sample, we followed the Hayes' (2013) method via SPSS PROCESS MACRO with 5000 bootstrapped samples to examine moderating effects for each product category individually. For each product category, we listed the Beta values in Table VI alongside that of the overall sample. We found that  $p$ -values for H3a, H3c, H4a and H4b were less than 0.05 for each product category and these results were similar to overall sample results. Thus, the moderating relationships, H3a, H3c, H4a and H4b were supported for each of the three product categories. We also noted that  $p$ -values for H3b and H4c were less than 0.05 for only the electrical goods/electronics category. Thus, we interpreted that H3b and H4c

were not supported for cosmetics and apparel but were for electrical goods/electronics (see Table VI).

Similar to that for the overall sample, we followed the Hayes' (2013) method via SPSS PROCESS MACRO with 95% confidence interval (CI) and 5000 bootstrapped samples to examine the mediation effects for each product category individually. For each product category, we listed the Beta values, standard error and  $p$ -values in Table VII alongside that of the overall sample. We found that  $p$ -values for H5a, H5b and H5c were less than 0.05 for each product category and these results were similar to overall sample results. Thus, mediating relationships (H5a, H5b and H5c) were supported for each of the three product categories (see Table VII). These results support the generalizability of most direct, moderating and mediating relationships across the product categories.

## **Discussion**

Information quality in green advertisements and its implications for consumers' decision-making is a critical issue, with some studies suggesting it influences their green brand perceptions and purchase intentions (e.g. Chang, 2011; Schmuck *et al.*, 2018). This study has extended on this by examining the mediating role of green brand credibility in influencing the relationship between green information quality and green brand evaluation, as well as the moderating roles of eco-label credibility and consumer knowledge. It would appear that this study is the first to define three information quality dimensions in a green advertising context (i.e. persuasiveness, completeness and credibility), subsequently answering calls to better understand how to communicate green claims to consumers (Matthes, 2019) and broadening the definition of information quality.

Furthermore, this study is one of the first to examine the direct, simultaneous effects of these green information quality dimensions on green brand credibility, as well as their indirect effects on green brand evaluation. The results indicate the direct effects of information persuasiveness, completeness and credibility on green brand credibility for the overall sample and across the three product categories, which suggests generalizability. This study therefore factored in de Pelsmacker and Janssens' (2007) suggestions to explore information quality in more detail and effects on general and product-specific consumer behaviour. Theoretically, this supports the direct effects for central route of information processing where consumers use information-related central cues (i.e. green information quality dimensions in this study) to process information and thus, make judgments (i.e. green brand credibility in this study). The results of direct effects in this study also align with prior studies that have found that complete information influences trust (van Birgelen *et al.*, 2000) and that credible information improves information usefulness (Gokerik *et al.*, 2018). Prior studies have also found that information quality positively influences brand awareness (Dabbous and Barakat, 2020) and brand involvement (McClure and Seock, 2020), which this study adds to by identifying that it improves consumer-perceived trustworthiness and expertise in a green brands context. This study has subsequently identified brand credibility as an important influence of green information quality.

These study results also further highlight the direct effect of green brand credibility on green brand evaluation, for the overall sample and were generalizable across the three product categories. This aligns with prior studies which have found that brand credibility affects consumer-perceived product quality (Erdem *et al.*, 2006; Erdem and Swait, 2004), as well as value and uniqueness (Bairrada *et al.*, 2018). The complexity of information means that green brands are often associated with perceived risks related to consumers' purchase decisions

(Chen and Chang, 2013), thus brand credibility has been shown to lower such perceptions (Erdem *et al.*, 2006) and to improve consumer evaluations of green brands. Consequently, the more credible green brands are, the higher the perceived quality and likelihood of purchase, corroborating prior studies that have supported a credibility-evaluation relationship (Luo *et al.*, 2013; Rampl and Kenning, 2014).

With regards to the mediating effect of brand credibility on the information quality and brand evaluation relationship, this study identified that the three green information quality dimensions were fully mediated by this for the overall sample and for each of the three product categories. These results indicate that green brand credibility enhances the effects of the three green information quality dimensions - persuasive, complete and credible - on green brand evaluation (i.e. consumer-perceived quality and likelihood to purchase). That is, if consumers do not perceive green brands as credible, the ad information has less of an effect on their brand evaluation. While other studies on green advertisements have mostly examined their direct effects on brand attitude and purchase intentions (e.g. Matthes *et al.*, 2014; Mo *et al.*, 2018), this study has identified that they do not directly affect green brand evaluation.

This study empirically demonstrates that green brand credibility often arises from associated green information quality, which in turn affects consumer-perceived green brand quality and likelihood to purchase them. It also indicates that while credible, complete and persuasive information on green products are important, they do not directly influence consumers' green product quality perceptions and likelihood to purchase them. That is, mere exposure to green advertisements does not necessarily result in positive evaluation of the brands; consumers need to positively assess the green information quality to enhance perceptions of green brand credibility. This reinforces the importance of the information-trust relationship, which is



instrumental in influencing brand evaluation and broadens the scope of consumer-brand relationships. This also highlights the importance of green brands establishing credibility in the target markets, which makes green advertisements more effective in generating consumers' favourable evaluations. This helps to explain why green advertisements are not always effective at generating favourable consumer responses toward green brands (Leonidou *et al.*, 2011; Mo *et al.*, 2018).

The importance of this mediating effect supports prior non-green research that has found a mediation effect of brand credibility, such as Spry *et al.* (2011) who reported that it mediates the relationship between endorser credibility and brand equity. It however potentially contradicts prior non-green studies that have identified a direct effect of information quality on consumer-perceived brand value (Carlson *et al.*, 2018; Zhang and Du, 2020) and consumer decision satisfaction (Gao *et al.*, 2012). For example, Gao *et al.* (2012) argued that high-quality information is quick and efficient for consumers to use, and directly improves decision satisfaction. Yet this study found that high-quality green brand information enhances brand credibility, which then improves brand evaluation. This indicates an indirect effect on green advertising, because advertising's fundamental purpose is to influence consumers' perceptions towards brand quality and motivate them to purchase (Chang, 2011; Tucker *et al.*, 2012), unlike web-based media that primarily facilitates interactivity and information-sharing. This study consequently surmised that the mediation effect of brand credibility is context-specific (i.e. green advertising) and is not universally applicable.

This study also found that consumer knowledge can moderate the effects of information persuasiveness and completeness on green brand credibility for the overall sample and the three product categories. This moderation effect has also been identified in other studies from an

information-processing perspective, such as Chebat *et al.* (2001) who found that high-knowledge consumers often process information intensely and can subsequently form positive attitudes toward low-involvement products. Ruth (2001) also found that the effect of brand's emotion benefit information on brand attitude was higher for high-knowledge consumers, which was attributed to their higher emotional involvement with the brands. It was therefore surmised in this study that high-knowledge consumers, when exposed to complex information, are better able to process the information.

This study also suggests a positive moderation effect of consumer knowledge, particularly among high-knowledge consumers where such information can enhance deeper cognitive responses (Mick, 1992); they tend to rely more on self-generated inferences (Wood and Lynch, 2002). Thus, high-knowledge consumers are more likely to relate their own thoughts and experiences when information processing. This study also identified that high-knowledge consumers are more likely to have previously engaged with green products, making them more confident of their knowledge, which they use to process green information that enhances green brand credibility. It was also determined as possible that high-knowledge consumers have stronger thoughts about green brands, and when the green brand information is consistent with their thoughts, it is more believable. That is, the results indicate that high-knowledge consumers are more likely to use an information-processing approach that reinforces their thoughts; a central route of information processing is used. In contrast, low-knowledge consumers may face difficulty in processing green advertising information and consequently have difficulty in using the central route of information processing. Thus, these results provide deeper insights into the role of consumer knowledge in delineating the influence of green information quality dimensions on green brand credibility, and confirms Elaboration

Likelihood Model for moderating effects of consumer involvement (i.e. consumer knowledge in this study) for central route affecting consumer judgments.

Furthermore, these results indicate that consumer knowledge only moderates the effect of information credibility on green brand credibility with respect to the electrical goods/electronics product category. This suggests the effect of information credibility on green brand credibility does not differ between high-knowledge and low-knowledge consumers for both the cosmetics and apparel product categories. This may be due to the generally higher costs of electrical goods/electronics goods, which means consumers want more information before purchasing. Alternatively, given that energy usage (an environmental characteristic) is a feature of electrical goods/electronics goods, such knowledge may be more important. High-knowledge consumers appear better able to apply their knowledge to assess information credibility and interpret brand credibility for electrical goods/electronics goods.

Another finding of this study is that eco-label credibility moderates the effects of information persuasiveness and information credibility on green brand credibility for the overall sample and the three product categories. It would appear that this study is the first to examine the effects of eco-label credibility in green information processing. While prior works have investigated the role of eco-labels on consumers' attitudinal effects (Atkinson and Rosenthal, 2014; Bickart and Ruth, 2012; Hoek *et al.*, 2013), this study extends on this by explicitly incorporating the effects of eco-label credibility in information processing. The study's results support prior non-green studies that have assessed the moderating effects of credibility within an information-processing perspective in several contexts. For instance, Tormala and Petty (2004) examined whether the effect of message persuasiveness on attitudinal change was moderated by source credibility and found that the relationship between attitude and consumer

intentions was strengthened when credibility was high. Similarly, Kareklas *et al.* (2015) found that in a health-related public services context, the sponsor's credibility positively moderated the effect of information persuasiveness on attitude. In line with this, this study has uncovered that it is not the ad's persuasiveness and credibility alone that positively influences green brand credibility; higher eco-label credibility strengthens consumers' green brand credibility perceptions. That is, more credible eco-labels increase consumers' confidence in green information, which enhances green brand credibility. In contrast, less-credible eco-labels make consumers unsure about the green information, which then weakens their confidence in the information and reduces the green brand credibility. This study's results have therefore deepened understanding on how eco-labels can effectively enhance green brand credibility.

This study also has implications for persuasion-credibility relationship in the context of eco-label credibility. These results contradict the finding of some other researchers that there is a negative moderation effect of source credibility on the persuasion-credibility relationship (Luo *et al.*, 2013). Luo *et al.* (2013) also indicated a direct effect of source credibility on recommendation credibility, which attenuates the effect of recommendation persuasiveness. Yet in this study there was no statistical evidence ( $\beta=0.04$ ,  $p=0.21$ ) of the direct effect of eco-label credibility on green brand credibility, which was tested separately to the proposed framework. It is subsequently argued here that the effect of information persuasiveness/credibility and eco-label credibility on green brand credibility in this study is additive, rather than related or substitutable in Luo *et al.*'s (2013) study. This indicates that peripheral cues (eco-label credibility in this study) strengthen the effects of central cues (information persuasiveness and information credibility in this study) on consumer judgments. While ELM conceptually does not discuss interactions between central and peripheral cues, this study builds on the ELM and adds an extension to the model. The impact of interactions

is something that should also be examined in non-green contexts, as this potential interaction may occur in a wider range of contexts.

Moreover, the apparent lack of a direct relationship between eco-label credibility and green brand credibility in this study was also contended by Bickart and Ruth (2012), who reported that the presence of an eco-label does not affect consumers' brand attitude. In line with this, this study found that credible eco-labels alone are not an effective influencer of credible green brands, which is why green brand credibility has been recognized as much more enduring and represents consumer-perceived brand reliability (Nicholson *et al.*, 2001). This way, this study does not support the ELM for the effects of peripheral cues on consumer judgments in green advertisement information processing.

This study also found that eco-label credibility does not necessarily moderate the effect of information completeness on green brand credibility, except in the electrical goods/electronics product category. This implies that the effect of information completeness on green brand credibility is generally the same for both high- and low-credibility eco-labels for the other two product categories (cosmetics and apparel). This may be because electrical goods/electronics are more complex; a higher-involvement product category involving complex information that consumers may find difficult to understand. Hence, it was found in this study that credible eco-labels serve as critical cues in green information processing.

### ***Managerial and policy implications***

This study offers brand managers a number of suggestions for designing green advertisements. For example, the results indicate direct effects of information persuasiveness, completeness and credibility on green brand credibility for electrical goods/electronics, cosmetics and

apparel products, which suggests managers need to more carefully consider green messaging. However, brand credibility may take some time to develop and thereby require a long-term investment in consistent messaging. As indicated in this study, if consumers do not perceive green brands to be credible, the use of green appeals could lower consumers' green product quality perceptions and their likelihood to purchase green brands across the three product categories.

Furthermore, when communicating green information, it is important to consider whether consumer responses will vary based on their level of environmental knowledge. This study identified that high-knowledge consumers are more likely to respond positively to green messages, while low-knowledge consumers may feel overwhelmed, reducing the effectiveness of the green information. Thus, when entering markets (or targeting segments) where green knowledge is lower, additional marketing support may be necessary to ensure that environmental information is appropriately understood, to develop credibility over time. It should also be factored in that the distinction between high- and low-knowledge consumers may potentially vary by product category, as identified in this study where it was greater in relation to electrical goods/electronics (against cosmetics and apparel). Other studies have also indicated that different levels of consumer knowledge are particularly important for more expensive goods or where environmental features (e.g. energy usage) are more salient (Gershoff and Frels, 2015).

The support for interaction effects between central and peripheral cues (i.e. information quality dimensions and eco-label credibility) in this study suggests to brand managers of green products that peripheral cues may positively or negatively impact high-knowledge consumers' information processing through central route. For high-knowledge consumers, the brand

managers should understand that central cues may not always positively affect green brand credibility and thus, focusing on central cues alone in green advertisements may not always be helpful. Rather, the brand managers should be mindful of peripheral cues as well when targeting high-knowledge consumers and be careful when seeking to associate with related cues (e.g. eco-labels in this study).

Brand managers of green products should also consider which eco-labels to use, as there are many in the marketplace. This study has identified the importance of partnering with eco-labels that have credibility. It would appear that the mere presence of eco-labels does not necessarily drive brand credibility. As peripheral cue (i.e. eco-labels) reinforce central cues (due to interaction effects between the two) in this study, selecting the right eco-labels is even more important for brand managers. This research also highlights the importance of eco-label organisations investing in such a way that they enhance the green brand's credibility, as a valuable partner of the firm.

### ***Limitations and directions for future research***

This study has several limitations. First, data were collected from highly-engaged consumers that could recall green advertisements completely and write narratives about the advertisements. Less-engaged consumers may not have been able to recall green advertisements during the survey, thus restricting findings of this study applicable to highly-engaged consumers. Second, the study was based on a sample of urban, educated consumers in one developing country. It should be replicated in other developing countries as well as in developed countries, including among lower-income consumers that comprise a significant proportion of the world's population. Third, this study examined a sample that, by design, had a relatively higher percentage of environmentally-aware consumers. Future research could also

examine the differences between green and non-green consumer responses (Barbarossa and de Pelsmacker, 2016), as most of the green products are seeking to broaden their appeal across various segments. Motivating non-green consumers to pay attention to environmental labelling might be another issue to explore. Fourth, this study collected data from environmental events and outside shopping malls that possibly generated higher response rates. Future work might look to undertake alternative data collection including using random samples of green consumers, for example those who are members of environmental groups or loyalty type programs with green retailers.

Fifth, this study did not differentiate between different types of eco-labels, and how the sponsor may impact on label credibility. Other research has suggested that the sponsor of the eco-label matters (Atkinson and Rosenthal, 2014), which could also be explored in future research. Sixth, alternative methodologies to this study's, such as experimental design and longitudinal research, may be more effective in assessing causality, which can only be inferred in SEM cross-sectional research (Bagozzi and Yi, 1988). Seventh, the study did not restrict to selection of green brands with government-approved eco-labels and neither performed a comparison between government-approved versus manufacturer/third-party eco-labels. Labelling literature (Atkinson and Rosenthal 2014) has identified that there are a range of official governmental and third-party labels, both of which are positively regarded by consumers. Work by Bickart and Ruth (2012) found that consumers (with higher environmental concern) had a favourable brand attitude and purchase intentions for goods with a manufacturer-based eco-seal source. As such it appears that some consumers perceive brands to be green based on all three types of eco-labels. We did not limit the brands to only though with one types of labels or another, but we have added a further column in the Appendix 1 that lists the governmental and third party



environmental logos identified, which were recalled for all products across the categories. Future research may seek to explore the impact of different types of eco-logos.

Lastly, the interaction effects between central and peripheral cues in this study has broader ELM implications. Although this study examined the interaction effects for green brands only, future research may explore interaction effects in non-green contexts. Finally, future research should also look at the degree of greenness of a brand that will of course vary and some brands are solely positioned around environmental attributes, whereas others have environmental claims incorporated with other claims. As such future research should seek to somehow weight the degree to which environmental attributes or emphases are incorporated in the brands.

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