Designing Credible Sustainability: A Conceptual Framework Linking Packaging Visual Cues, Cue Congruence, Green Trust and Perceived Greenwashing

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ABSTRACT

Consumers are increasingly concerned about packaging waste and sustainability, putting brands under growing pressure to communicate their environmental responsibility through sustainable packaging. But consumers generally do not have direct access to the real environmental performance of packaging and often must rely on visual and informational cues to determine whether a package appears environmentally responsible. Prior research has examined individual cues such as colour, material appearance, minimalist design, eco labels and environmental claims, recycling information, but these cues have typically been studied in isolation rather than as part of an integrated sustainability communication system. This conceptual paper synthesizes recent literature on sustainable packaging design, visual communication, green trust and greenwashing to develop an integrated framework that explains how packaging communicates credible sustainability. The framework, grounded in the Stimulus Organism Response perspective and cue-based interpretation, distinguishes between implicit visual sustainability cues (colour, typography, imagery, material appearance and visual complexity) and explicit informational cues (eco labels, sustainability claims, certifications, recycling information and traceability evidence). This paper introduces cue congruence as a key mechanism explaining how consumers evaluate the consistency of visual sustainability signals and their associated environmental information. Congruent cues can improve perceptions of sustainability, authenticity and green trust, while incongruent or unsupported sustainability signals may increase the perception of greenwashing and decrease consumer trust. The proposed framework broadens sustainable packaging research beyond material performance and purchase intention, positioning graphic design and visual communication as important mechanisms for the establishment of sustainability credibility. It also offers a theoretical basis for further empirical studies and practical implications for designers and brand practitioners on how to communicate sustainability credibly.

Keywords: Sustainable Packaging Design, Visual Sustainability Cues, Cue Congruence, Green Trust, Perceived Greenwashing

INTRODUCTION

Packaging has moved beyond its traditional role of containing, protecting, preserving and carrying products. It is now a major interface between products, brands and consumers, communicating functional benefits, brand recognition, quality expectations and increasingly environmental responsibility. Academic research and business practice have shown growing interest in sustainable packaging, driven by mounting concerns over plastic waste, the excessive use of resources, and the environmental effects of production and disposal. Consumers are being asked to make more environmentally responsible purchasing and disposal decisions, and there is a growing expectation for businesses to reduce the impacts of packaging on the environment. Sustainable packaging has thus become a key element in broader conversations about sustainable consumption, circularity and corporate environmental responsibility. Recent systematic evidence indicates that research in this field has grown dramatically, especially in the areas of consumer attitudes, behavioural determinants, willingness to pay,

packaging materials and perceptions of sustainable packaging systems (Kıymalıoğlu et al., 2024; Kozik-Kołodziej, 2026).

Despite this growing attention, sustainable packaging still presents a distinctive communication problem. The actual environmental performance of a package is often hard for consumers to judge at the point of purchase, since properties such as recycled content, carbon impact, material recovery, recyclability and lifecycle performance are not always directly observable. Consumers therefore rely on the cues available to them to infer whether a packaging solution is environmentally responsible. Herbes et al. (2020) showed that consumers draw on a range of such cues when identifying environmentally friendly packaging, including labels, written information, packaging materials, colour and overall appearance, and that a comparative study across Germany, France and the United States found the relative importance placed on these cues varies by cultural context: labels were particularly influential overall, while some consumers relied more heavily on material appearance, colour and other perceptual characteristics. These findings indicate that sustainability is not simply an environmental characteristic of packaging; it is also a meaning that must be recognised, interpreted and evaluated by consumers.

This process of interpretation situates visual communication at the heart of sustainable packaging design. Packaging communicates in several design elements such as colour, typography, imagery, form, texture, material appearance, visual simplicity and information hierarchy. Several of these elements have environmental meaning implicitly. For example, green or muted colours, natural textures, paper-like surfaces, botanical imagery and minimalist layouts can trigger associations of nature, simplicity and environmental responsibility without making a direct environmental claim. Other elements communicate sustainability directly through eco labels, certifications, recycling symbols, environmental statements or disposal instructions or traceability information. Granato et al. (2022) differentiate between implicit packaging cues, such as visual, tactile and sensory design properties, and explicit cues, such as labels, logos and environmental statements. Their experimental results show that explicit and implicit cues can be combined to affect sustainability salience, perceived sustainability and disposal behaviour. But, importantly, the more environmental cues the better is not necessarily the case for sustainability perceptions. Some combinations can be redundant or even generate sceptical questions, indicating that effective sustainability communication does not depend on the number of green signals, but on their interaction.

New design research adds to the evidence that packaging appearances influence environmental judgements. Ding et al. (2024) found that minimalist packaging can create more green trust than visually complex packaging because visual simplicity may reduce perceived manipulative intent. Their research shows how the graphical representation of a sustainable product can influence whether consumers perceive it as credible or not. Lee and Yoo (2025) examined consumers' perceptions of different eco-oriented packaging design approaches in a similar fashion. They discovered that consumers were more likely to respond positively to the appearance of environmental friendliness rather than to actual improvements in environmental performance. Their results reveal a potentially important distinction between perceived environmental friendliness and environmental improvement. This difference is especially relevant in the case of graphic design, as consumers may make sustainability judgements based on aesthetic features that are immediately perceivable, even when they may be a poor indicator of the actual environmental performance of the packaging.

This perception gap is both an opportunity and a challenge for sustainable packaging communication. Good visual design can make environmental benefits more visible, simplify information and help people to make responsible consumer choices. But the same visual language can also create an environmental impression that exceeds the actual sustainability evidence available. A package may seem sustainable through the use of natural colours, the look of kraft paper, the use of leaf images, minimal printing, or environmental language, even when there is little verifiable information given to consumers to support such an interpretation. In contrast, a packaging solution with significant environmental improvements may not be able to communicate these benefits if its sustainability information is unclear, visually inaccessible or difficult to understand. The communication challenge is therefore not only whether sustainable design cues are there, but whether the visual impression that such cues generate is in line with explicit and credible sustainability information. This issue is particularly salient in relation to greenwashing. Sustainability is an increasingly important aspect of brand communication, and it forces consumers to distinguish between real environmental improvements and overstated, vague and

unsubstantiated green claims. Therefore, recent research on sustainable packaging has been more oriented toward trust, transparency and credibility. For example, Ashwini and Moodbidri (2026) found that brand trust plays an important role in consumers' willingness to support sustainable packaging. Eco label credibility and transparent communication enhance trust-related responses and perceived greenwashing risk reduces them. Their TRUST PACT framework shows that even positive attitudes toward the environment may not be enough if consumers are sceptical about the veracity of sustainability claims. Similarly, Musaddad et al. (2026) found in Malaysia that sustainable packaging and transparent communication had a positive effect on perceptions of corporate sustainability, indicating the importance of visible, credible and well communicated environmental practices. The findings suggest an increasing association between sustainability communication and consumer trust.

But one key conceptual issue remains underdeveloped. The existing literature explains much about consumer responses after sustainable packaging, environmental claims, eco labels or sustainability information have been recognised and evaluated. The graphic and visual processes through which consumers initially evaluate the coherence and credibility of sustainability communication have been less studied. Research has investigated individual cues like colour, material, visual complexity, minimalist aesthetics, environmental labels and sustainability claims, but these elements are often considered in isolation. Consumers do not encounter these elements in isolation; they encounter a complete package in which colour, typography, material appearance, imagery, environmental claims, certification marks and disposal information. To understand sustainable packaging, more attention needs to be paid to the relationship between these cues, rather than their individual effects.

Recent reviews reaffirm the need for more conceptual integration. Kıymalıoğlu et al. (2024) explored sustainable packaging research from the Stimulus Organism Response perspective, revealing that packaging stimuli influence consumers' internal evaluations and their ensuing responses. This provides a useful theoretical rationale for positioning visual and informational packaging characteristics as stimuli that shape consumer perceptions. In more recent times, Kozik-Kołodziej (2026) undertook a systematic review of 78 publications and identified three dominant streams in the literature: consumer attitudes and behavioural determinants, willingness to pay, and perceptions of packaging materials and systems. Issues that recurred included trust in labeling, environmental awareness, functionality and price. While these streams have advanced understanding of sustainable packaging adoption, they also point to research still being heavily focused on downstream behavioural responses; the visual communication mechanisms through which sustainability credibility is constructed need further development.

The growing interdisciplinary aspect of sustainable packaging research is also reflected in a recent conceptual framework by Saud et al. (2026). The authors used bibliographic coupling to suggest relationships between sustainable packaging, social media, public engagement, recycling innovation and behavioural determinants. Their framework advances the understanding of sustainable packaging adoption at the behaviour and communication level. It does not, however, specifically address the role of the visual language of packaging in judgements of sustainability credibility, or how the consistency of visual and informational cues may differentiate credible communication from perceived greenwashing. This opens a more design-centred conceptual explanation, considering packaging not just as an environmentally improved physical object but also as a visual communication system through which environmental meaning and credibility are constructed. Thus, this paper proposes cue congruence as a key mechanism for understanding credible sustainability communication in packaging design.

Cue congruence means the extent to which implicit visual cues of sustainability are congruent with the explicit informational evidence provided through packaging. Implicit cues are colour, typography, imagery, the appearance of material and texture, minimalism and visual complexity, while explicit cues are eco labels, certifications, environmental claims, recycling instructions and traceability information. If consumers are provided with visual cues and clear, credible evidence of environmental claims, they are more likely to perceive the packaging as authentic and trustworthy. On the other hand, consumers may view visual sustainability signals as deceptive or greenwashing if they are excessive, contradictory, or poorly backed by clear environmental evidence. Hence, the proposed concept is an extension of previous research on the combination of packaging cues with a particular focus on the credibility implications of their consistency.

The paper is motivated by three objectives. Firstly, it seeks to synthesize the extant literature on visual and informational cues employed to communicate sustainability through packaging design. Second, it conceptually discusses how congruence between these cues could influence perceived sustainability, perceived authenticity, green trust and perceived greenwashing. Third, it proposes an integrated conceptual framework that captures the possible impact of visual communication of sustainable packaging on consumer responses. The framework, drawing mainly on the Stimulus Organism Response perspective and supported by cue-based interpretation, positions packaging visual and informational cues as sustainability stimuli, cue congruence and associated perceptions as internal evaluative processes, and green trust, perceived greenwashing and subsequent consumer responses as outcomes. The paper contributes to the literature in several ways. Firstly, it expands the scope of sustainable packaging research beyond materials, environmental performance and behavioural intention by positioning graphic design and visual communication as core mechanisms of sustainability interpretation. Second, it integrates design variables that have been studied in isolation and proposes cue congruence as a mechanism linking their combined communication to credibility. Third, it links sustainable packaging design to the emerging issues of authenticity, green trust and perceived greenwashing, providing a conceptual explanation for why environmentally styled packaging may generate trust in some contexts but scepticism in others. Finally, the proposed framework lays a foundation for future empirical research, where relationships can be tested across product categories, cultural contexts and consumer groups, including further exploration in the Malaysian market. In practice, the framework can also help designers and brand practitioners to develop packaging that is sustainable not only in look, but also in communicating environmental responsibility in a visually consistent, transparent and credible way.

LITERATURE REVIEW AND THEORETICAL FOUNDATION

Sustainable Packaging Design and Consumer Interpretation

Sustainability in packaging extends beyond replacing conventional materials with greener alternatives. It involves reducing environmental impacts across the packaging life cycle while maintaining essential functional requirements, including product protection, transportability, storability, usability and communication. Modern approaches are material reduction, recycled and renewable materials, reusable systems, simplified structures, improved recyclability, reduced printing and packaging systems designed for circular resource flows. In consumer contexts, however, environmental benefits must be recognised and understood before they can influence attitudes or behaviour. Recent literature suggests that consumer responses to sustainable packaging are multi-dimensional, rather than solely driven by environmental performance.

Kozik-Kołodziej (2026), in a systematic review of 78 studies published between 2019 and 2025, identified three dominant research streams: consumer attitudes and behavioural determinants, willingness to pay for sustainable packaging, and perceptions of packaging materials and systems. Environmental awareness, functionality, price, perceived usefulness and trust in sustainability information repeatedly emerged as important influences on consumer acceptance. These findings demonstrate that environmental superiority alone does not guarantee favourable consumer response. Packaging must also satisfy functional expectations and communicate its environmental value in a manner consumers can recognise and trust.

The gap between technical sustainability and consumer perception is particularly relevant from a design perspective. Lee and Yoo (2025) compared consumer responses to packaging developed through material substitution, plastic reduction and printing minimisation. Their findings showed that consumers were particularly responsive to packaging that visibly appeared environmentally friendly, especially material changes, while less visually obvious environmental improvements were not necessarily recognised to the same extent. Crucially they found that consumers responded more positively to environmentally friendly visual cues than actual environmental performance. This is a good example of the difference between environmental performance and perceived sustainability. Sustainable design decisions can reduce ecological impacts without creating strong perceptions of sustainability, while design features that are culturally or visually associated with environmentalism can create strong perceptions even with little environmental improvement.

Comparable outcomes are obtained for the domain of material perception. Van Schoubroeck et al. (2023) tested paper packaging with visibly recognizable recycled waste and found that packages with visible waste were perceived more environmentally friendly than regular packages. Sustainability received especially positive ratings with regards to brown packaging with agricultural waste. Berthold et al. (2024) also found that cardboard packaging was perceived as more sustainable in comparison to plastic packaging, while green colour influenced other consumer evaluations such as perceived healthiness. The results imply that consumers often rely on visible cues as heuristic cues for sustainability.

Therefore, packaging design is an important mediator between the actual environmental performance and the consumer perception. From a sustainability point of view, the best packaging solution should have the lowest environmental footprint. But from a communicative point of view, the environmental qualities of that solution must be possible to interpret also through visual, material or informational signals. This difference is the basis for approaching sustainable packaging not only as an environmental object, but also as a visual communication system in which meaning about sustainability is constructed.

Visual Communication of Sustainability Through Packaging

Packaging communicates through the simultaneous interaction of the graphic, structural, material and information elements. Consumers rarely evaluate colour, typography, material, symbols, claims and imagery in isolation. Instead, these elements work together to create an overall interpretation of the product and the brand. Visual communication is especially important in sustainable packaging, since many environmental features are credence properties, which consumers cannot verify directly during normal buying choices. Consumers are therefore dependent on signals offered through packaging to form judgements related to environmental responsibility.

Granato et al. (2022) make a significant distinction between implicit and explicit sustainability cues. Implicit cues indirectly convey the meaning of the environment through visual, tactile, auditory or material characteristics, whereas explicit cues communicate sustainability through more direct mechanisms such as logos, labels and environmental statements. Across three experimental studies, the authors showed that combining explicit and implicit cues can enhance sustainability salience, perceived packaging sustainability and sustainable disposal behaviour. However, their findings also revealed that additional cues do not always enhance sustainability communication. If an implicit cue already has a strong sustainability meaning, adding explicit sustainability information can create little additional value, and may even reduce the effectiveness of the message.

This finding is contrary to the assumption that the communication of sustainable packaging is reinforced by the number of environmental indicators presented to consumers. Instead, it seems to be the relationship between cues that matters. All of a package can have recycled-looking material, a green colour, botanical illustrations, an eco-label and an environmental claim. However, if the cues do not coalesce into a coherent message, the overall communication may seem overdone, inconsistent, or strategically constructed, even if each element independently suggests sustainability.

This is also supported by wider packaging research in terms of the visual communication perspective. A recent systematic review on packaging design has shown that visual, informational and structural dimensions influence consumers' evaluation and purchase related responses, which further stresses the importance of packaging as a multidimensional communication tool. In sustainable packaging, Perret et al. (2025) found that material, labels, colour, refill options and QR codes did not equally contribute to consumer sustainability perception and willingness to pay. Material had a strong influence, and labels and colour became more relevant when respondents thought about perceived sustainability. Importantly, the packaging attributes affecting sustainability perception did not map to those affecting willingness to pay, showing that sustainability perception and willingness to pay are related but conceptually distinct processes.

Therefore, sustainable packaging design should be considered a system of interrelated signs rather than a series of independent aesthetic decisions. The present conceptual paper therefore differentiates between two general

types of sustainability communication: implicit visual sustainability cues and explicit informational sustainability cues. This difference forms a basis for an inquiry into the construction of environmental meaning in a pre-consumer context, before the advent of responses such as trust, scepticism or behavioural intention.

Implicit Visual Sustainability Cues

Packaging features that imply environmental responsibility without explicitly making an environmental claim are known as implicit visual sustainability cues. These could be colour, typography, imagery, material appearance, texture, visual simplicity, print intensity and overall visual complexity. These cues are based on learned associations and perceptual heuristics that allow consumers to make relatively rapid sustainability judgements. Colour provides one of the clearest examples. Green has been associated with nature, environmental responsibility and ecological products for a long time. However, recent evidence suggests that this association can affect sustainability judgment even when no substantive environmental information accompanies the colour. Leng (2025) experimentally manipulated the colour of the packaging and found that participants were more likely to identify green packaging as environmentally sustainable, even when the compared products were otherwise identical. Crucially, environmental literacy did not remove the effect. The study shows that visual colour cues can contribute to sustainability inferences beyond environmental cues. This brings up significant issues about the line between meaningful environmental communication and visual greenwashing.

Another powerful implicit cue is material appearance. Consumers perceived cardboard packaged products as more sustainable than similar products packaged in plastic, according to Berthold et al. (2024). Similarly, Van Schoubroeck et al. (2023) found that visible recovered waste content can be a clue to sustainability, with brown paper-based materials being especially positively evaluated in terms of the environment. These results show that the visual properties of the material work symbolically as well as functionally. Consumers can infer environmental properties from the surface appearance, even without detailed lifecycle information.

Visual simplicity also influences sustainability related judgements. Minimalist packaging triggered stronger green trust in common consumer products, according to Ding et al. (2024) who compared minimalist and visually complex packaging. More visually complex packaging may attract more attention, but complexity did not lead to greater environmental trust. The authors partly ascribed the effect to lower manipulation inference in the case of minimalist presentation. This is especially true for sustainable graphic design, where simplicity can be a way of demonstrating restraint, reducing the use of resources in consumption and production, even if consumers are not directly calculating these environmental impacts. To further support their claims, Lee and Yoo (2025) explore printing minimization and material substitution.

Their findings indicate that consumers link certain visible design strategies to environmental friendliness but may not notice less perceptually obvious improvements in sustainability. This means environmental effectiveness and perceptual effectiveness can differ. Thus, the graphic designer takes on an important role of interpretation, in translating environmental actions into visible forms which consumers are able to understand. At the same time, there is an ethical issue concerning the persuasive force of implicit cues. If colour, texture, typography and minimalist aesthetics can create sustainability impressions without verified environmental improvements, then it is possible to use the same visual language strategically to create an environmentally favourable image without meaningful environmental performance. Hence, implicit cues should not be accepted as evidence of sustainable packaging. Rather, they should be viewed as perceptual cues whose credibility may be contingent upon their relationship with more explicit sustainability information.

Explicit Informational Sustainability Cues

Explicit informational cues provide environmental attributes directly or provide information that is intended to facilitate sustainable decision making. These include eco labels, certifications, recycling symbols, environmental claims, disposal instructions, recycled content information and increasingly QR based or digitally traceable information. Explicit cues differ from implicit cues in that they offer consumers a more direct basis for interpreting environmental performance rather than relying primarily on visual association.

Eco labels are among the most researched explicit sustainability cues as they offer simplified environmental information in the limited visual space of packaging. Stimulus Organism Response model was used by Nguyen Quoc et al. (2025) to investigate green packaging, branding and eco labelling among young Vietnamese consumers. Their results indicated that eco labelling was more influential on consumer cognitive attitudes than green packaging and branding alone. It suggests that clear environmental information can be especially influential when consumers are looking for credible evidence concerning product sustainability. Another dimension of this issue is the recent research on semiotic knowledge. In his study on young consumers' responses to recycled packaging, Nguyen (2026) found that the ability to understand environmental symbols significantly impacted attitudes, which then influenced purchase intention and positive emotional responses.

Semiotic knowledge influences whether an environmental symbol is merely present on the package or is meaningfully interpreted by the consumer. This finding has important implications for the design of information. The mere presence of an eco label or recycling symbol does not ensure effective communication. The consumer must understand what it means, its credibility and its relevance. This concern is supported by eye tracking evidence at a more fundamental perceptual level: in a systematic review of eye tracking studies on sustainability labels, Hoffmann et al. (2025) found that such labels often attract limited visual attention and can be easily overlooked when embedded in other packaging information, suggesting the communicative potential of a label is contingent on whether it is actually observed in the first place.

Similarly, Perret et al. (2025) found that labels had a large impact on perceptions of sustainability in cosmetic packaging. Their conjoint analysis showed that package material was still an important factor but that labels were becoming increasingly important when considering sustainability perception rather than willingness to pay. Their study found that QR codes had a relatively small effect on willingness to pay. Thus, more environmental information or digital access does not necessarily result in a strong consumer response if the information is not seen as relevant, understandable and worth the cognitive effort to access it. Credibility is particularly important, because consumers cannot usually verify many environmental claims on their own. Ashwini and Moodbidri (2026) found that perceived greenwashing risk negatively affected trust related responses to sustainable packaging while credible eco labels and transparent sustainability communication positively affected trust related responses to sustainable packaging. Their model, TRUST PACT, proposes that sustainable consumption decisions are made under the conditions of information asymmetry, in which external verification, clarity and transparency become important mechanisms to reduce uncertainty. Thus, explicit information has at least two functions. First, it helps consumers identify environmental features that would otherwise be invisible. Second, it can provide evidence that supports or contradicts the sustainability impressions created by visual design. This second role is particularly important for the present framework, because explicit information offers a potential point of comparison with implicit visual signals.

Cue Congruence, Perceived Authenticity and Sustainability Credibility

Although existing studies have demonstrated that both implicit and explicit sustainability cues influence consumer perceptions, fewer studies have conceptualised their relationship as a question of overall communication congruence. The concept of **cue congruence** proposed in this paper refers to the perceived consistency between the sustainability impression created by the visual design of packaging and the environmental information or evidence made available to support that impression.

This argument finds support in the empirical work of Granato et al. (2022). Their study suggests that explicit and implicit cues interact and do not just work independently to affect sustainability perception. When implicit cues do not provide meaning regarding sustainability, explicit information can provide interpretive meaning and enhance recognition of sustainability. By contrast, when an implicit cue already carries strong environmental meaning, the addition of explicit cues may add little benefit or even be counterproductive. This means that the sustainability communication partly depends on the suitability of the elements to complement each other.

Steenis et al. (2023) studied a relevant issue by using the concept of claim-fact incongruity. In their experiments, they found that consumers could detect deception when broad environmental claims communicated a level of sustainability that did not match the actual environmental characteristics of the packaged product. Consumers

may notice some environmental improvements but may feel misled if the overall claim goes beyond the facts. Moreover, hyperbolic environmental rhetoric may also contribute to perceptions of deception. The claim fact discrepancy perspective can be extended to the visual domain. Design can create an environmental impression, not only written claims. A package may for instance visually convey nature, ecological purity and material restraint, but reveal little information about its actual material composition or environmental performance. Notably, the results of Leng (2025) are particularly relevant, as the effect of green packaging on perceptions of environmental sustainability was noted even in isolation. Similarly, Lee and Yoo (2025) showed that the perceptual effect of visual eco-friendly attributes may be greater than actual environmental improvements. These findings suggest that consumers may be influenced by design cues in their environmental judgements prior to assessing objective evidence of sustainability.

Cue congruence is thus a way to bring together these previously disparate observations. When implicit design cues and explicit environmental evidence act in concert, the communication is more likely to be perceived as coherent and credible. For example, a recycled material look with recycled content data behind it sends a more consistent sustainability message than an environmentally styled package with no supporting data. Thus, congruence may enhance perceived authenticity by decreasing uncertainty about whether the sustainability message is a true reflection of environmental characteristics.

However, the visual impression may be at variance with the evidence in the environment, leading to incongruent cues. This could be overblown ecological design, claims that are broad and not substantiated by certification, vague language or environmental imagery that exaggerates the true improvement to the package. Incongruence in cueing does not imply that the package has no benefit to the environment. This means that the communication creates an impression that is hard to reconcile with the evidence available to the consumer. This is an important distinction for the proposed framework, since it conceives of authenticity and credibility as a function of interpretive consistency rather than merely the presence of sustainable design elements. The question is not whether a package has green cues but whether the combination of visual and informational cues in concert, produces a defensible, coherent environmental message.

Green Trust and Perceived Greenwashing

Green trust is the belief that environmental claims, practices or sustainability commitments are believable and credible. Trust becomes even more important for sustainable packaging, as environmental performance is not always easy to judge directly. In a typical purchase consumers can see the colour, material appearance and environmental labels but cannot easily verify lifecycle emissions, material sourcing or actual recyclability. Trust thus helps consumers decide on a purchase in the face of imperfect information. Ding et al. (2024) also found that the package design itself can create green trust. Minimalist packaging was found to elicit greater green trust in part through reducing perceptions of manipulation attempts in the design. That means trust isn't just a matter of corporate reputation and formal certification. It can also be influenced by how environmental meaning is visually represented.

More recent studies support the central role of trust. Brand trust mediates willingness of Gen Z consumers to pay for sustainable packaging (Ashwini & Moodbidri, 2026). This relationship was strengthened by the credibility of the eco label and the transparency of communication and was weakened by perceived greenwashing. Their results reveal how positive environmental attitudes may not translate to behavioural commitment when credibility is ambiguous.

The evidence from Malaysia suggests the same. Musaddad et al. (2026) investigated sustainable packaging, carbon emissions reduction, and straightforward communication among Malaysian university consumers. Sustainable packaging and transparency had a significant effect on perceptions of corporate sustainability, and the authors pointed out the value of visible, credible and well communicated environmental actions. Although the study adopted a rather broad approach to sustainable packaging, the results confirmed the importance of linking visible sustainability actions with reliable communication. Greenwashing is the flip side of this credibility process. This is when the environmental communication creates a more positive image of sustainability than the environmental performance or evidence warrants. Perceived deception is amplified if

there is a mismatch between sustainability claims and the actual features of the product, leading to harm in product and firm evaluations (Steenis et al., 2023). Leng (2025) takes this concern straight to the issue of packaging aesthetics, demonstrating that even the simple act of changing to green packaging can shift perceptions of sustainability.

Hence, the distinction between green trust and perceived greenwashing is especially useful for sustainable packaging design. Both may originate in the same communication environment but mean different things. When visual and informational cues are consistent, supported and transparent consumers may infer credibility and build green trust. Greenwashing can be perceived when these cues are exaggerated, contradictory or unsupported, in which case consumers can infer strategic manipulation. The proposed framework thus views greenwashing not only as inaccurate written statements but also as visual design which can result in perceptions of greenwashing when environmental styling does not match environmental evidence.

Theoretical Foundation: Stimulus Organism Response Model

The proposed conceptual framework is primarily based on the Stimulus Organism Response model. The model considers the influence of environmental stimuli on the internal cognitive or affective conditions of individuals, which then result in behavioural or attitudinal responses. This structure is especially fit for research on packaging as packaging is an environmental stimulus directly experienced during the consumer's evaluation whereas perceptions, emotions and judgements of credibility are internal processes that occur prior to a behavioural response. Kıymalıoğlu et al. (2024) systematically reviewed 63 studies on sustainable packaging and consumer behaviour, classifying their results according to the Stimulus Organism Response model.

Their review identified sustainable packaging, packaging attributes and marketing characteristics and external factors as types of stimuli that were likely to trigger internal consumer evaluations and subsequently influence behavioural responses. Importantly, they concluded that research on sustainable packaging is fragmented theoretically and identified opportunities for greater theoretical integration. The model has also been used empirically in contemporary research on sustainable packaging. Nguyen Quoc et al. (2025) conceptualized green packaging, green branding and eco labelling as stimuli, the cognitive and affective attitudes as organism variables and the conative attitude and implementation as responses. Their findings further confirm that packaging related sustainability signals can operate as external stimuli that influence internal evaluations before behavioural outcomes occur.

For the framework proposed in this paper, the Stimulus Organism Response structure is adapted specifically to **visual sustainability communication**. The stimulus component is twofold. The first involves implicit visual sustainability cues, such as colour, typography, imagery, material and texture appearance, minimalism and visual complexity. The second type includes explicit information sustainability cues, such as eco labels, certifications, environmental claims, recycling information, disposal instructions and traceability evidence.

The Organism component represents consumers' internal interpretation of these stimuli. The current framework suggests that consumers do not transfer directly from sustainable packaging cues to purchase intention, but rather, they assess the sustainability meaning and credibility of the package. Perceived sustainability is the extent to which packaging is perceived to be environmentally responsible. Cue congruence is the perceived correspondence of visual signals and explicit cues. When cues appear to support each other, authenticity and credibility are created, whereas if consumers perceive inconsistency, exaggeration or lack of substantiation, greenwashing is perceived.

The Response component represents subsequent consumer reactions. Green trust is an important credibility-related response that can influence broader consumer outcomes such as positive brand attitudes, preference for packaging, purchase intention, and willingness to support sustainably packaged products. Perceived greenwashing is a negative response pathway that can reduce trust and undermine positive behavioural outcomes.

This adaptation differs from models that consider sustainable packaging as a single stimulus or directly relate environmental packaging to behavioural intention. The proposed framework instead directs analytical attention upstream to the interpretive process through which visual sustainability becomes credible or questionable. This is particularly important given recent literature which shows that a package may appear sustainable without necessarily providing equivalent environmental evidence, while genuine environmental improvements may be left unrecognised if not communicated effectively.

The Stimulus Organism Response model thus provides the structural logic to explain the proposed relationships, while the distinction between implicit and explicit cues and the concept of cue congruence provide the design specific mechanism. Together these elements support a conceptual framework for the evaluation of sustainable packaging communication not only by the number of environmental cues present, but by how coherently those cues work to support perceived sustainability, authenticity and green trust, whilst reducing the likelihood of perceived greenwashing.

METHODOLOGY

Review Design

This study adopted a **structured conceptual literature review** to synthesise existing knowledge on sustainable packaging design, visual sustainability communication, cue congruence, green trust and perceived greenwashing. The intent in this review was not to assess a generic statistical effect or to create a comprehensive meta-analysis of sustainable packaging research. Rather, it sought to identify relevant concepts, relationships and theoretical patterns from the literature and integrate them into a new conceptual framework. Structured literature reviews are particularly useful when the objective is to consolidate fragmented knowledge, identify conceptual relationships and support theory development through a transparent review process (Rocco et al., 2023). Similarly, conceptual systematic reviews emphasise the systematic retrieval and coding of literature to clarify concepts and develop theoretically meaningful classifications and relationships rather than merely summarising previous findings (Schreiber & Cramer, 2024).

The review process was informed by the transparency principles of the PRISMA 2020 guidelines, particularly in relation to defining the search strategy, eligibility criteria and screening procedures (Page et al., 2021). However, the present study was designed as a conceptual review rather than a full PRISMA systematic review. This distinction was necessary because the objective was to integrate findings across heterogeneous research designs, including experimental studies, surveys, qualitative studies, systematic reviews and conceptual work, in order to develop a theory informed explanation of credible sustainability communication in packaging design. Comparable systematic methodologies have recently been employed in sustainable packaging studies to categorize diverse evidence and pinpoint theoretical deficiencies (Kıymalıoğlu et al., 2024; Kozik-Kołodziej, 2026).

Literature Search Strategy

The literature search was mainly restricted to peer reviewed articles published between January 2020 and September 2026. The period was chosen to reflect the rapid growth of sustainability related packaging research in recent years, and to capture contemporary developments in sustainable packaging, environmental communication, green trust, greenwashing and consumer responses. The previous studies were reviewed selectively, as far as they provided the theoretical or conceptual bases directly relevant to the development of the proposed framework. We performed searches in a range of multidisciplinary academic databases and publisher platforms including Google Scholar, the Directory of Open Access Journals (DOAJ), ScienceDirect, SpringerLink, Wiley Online Library, SAGE Journals and MDPI. In addition, reference lists of highly relevant reviews were scrutinized to find any other studies that may have been overlooked with the initial keyword combinations.

Prioritization was given to publications with openly available full texts to permit a detailed review of the research objectives, theoretical framework, methodology, results and declared limitations. Search terms were developed

across four conceptual domains. The first focused on sustainable packaging and included terms such as "sustainable packaging", "green packaging", "ecofriendly packaging", "environmentally friendly packaging" and "sustainable packaging design". The second was related to visual and design characteristics and included "packaging visual cues", "packaging colour", "minimalist packaging", "packaging typography", "material appearance", "packaging design", "visual sustainability" and "eco design". The third domain covered explicit communication on sustainability, using terms such as "eco label", "environmental claim", "sustainability claim", "recycling label", "environmental information", "QR code" and "sustainability communication". The fourth was on consumer perception and credibility, with terms such as "consumer perception", "perceived sustainability", "green trust", "greenwashing", "authenticity", "credibility", "purchase intention" and "consumer behaviour". The terms were combined using Boolean operators (AND, OR) to progressively narrow the search.

Inclusion and Exclusion Criteria

Several criteria were applied to include articles. First, studies had to be published in peer-reviewed academic journals, and in English. Secondly, the full text had to be available for detailed inspection, either openly accessible or otherwise. Third, the study had to address sustainable or environmentally responsible packaging in relation to at least one of the dimensions relevant to the proposed framework, which could be packaging design, visual communication, material appearance, environmental labels, sustainability claims, consumer perception, green trust, perceived authenticity, greenwashing or behavioural response. Both empirical and conceptual studies were included because the objective was to synthesize theoretical relationships across types of evidence.

Studies were excluded if they dealt solely with technical packaging engineering and did not have a meaningful consumer, communication or design component. These included studies that only concerned polymer chemistry, barrier performance, mechanical properties, manufacturing processes or life cycle assessment where consumer interpretation was not examined. The main literature matrix excluded conference proceedings, book chapters, trade publications, non-peer reviewed reports and publications without accessible full text. Broader studies of sustainability or green consumption were retained only when they directly contributed to understanding packaging communication, trust or greenwashing. Explicit inclusion and exclusion criteria were used to maintain consistency and provide sufficient breadth for conceptual development. This approach is consistent with recent reviews of sustainable packaging that also excluded technically oriented studies when the research objective was focused on consumer responses and sustainability perceptions (Kıymalıoğlu et al., 2024; Kozik-Kołodziej, 2026).

Screening and Literature Matrix

The retrieved literature was sequentially screened by title, abstract and full text. In the first step, titles and abstracts were screened for relevance to sustainable packaging, visual design, sustainability communication or consumer interpretation. Relevant publications were then thoroughly analysed. Focus was given to studies on specific visual or informational cues of packaging, consumer sustainability perceptions, environmental credibility, trust and misleading sustainability communication.

After screening, a core corpus of 33 highly relevant open access studies was included for detailed conceptual analysis. The identified publications were structured into a cohesive literature matrix to facilitate comparison across research. The matrix recorded for each article author and year, article title, journal, geographical context, research objectives, research design, theoretical perspective, packaging or design variables, principal findings, limitations, thematic relevance and potential contribution to the proposed research gap.

The literature matrix was especially helpful because the reviewed studies varied greatly in methodology and focus. Others examined material and colour, minimalism, eco labels, reusable packaging, semiotic interpretation, transparency, trust or greenwashing. This provided the opportunity to arrange these studies in terms of common analytical categories, rather than regarding each publication as a separate contribution. This made it possible to identify similarities, differences and missing links. Similarly, recent reviews on sustainable packaging have synthesized a collection of studies and uncovered larger theoretical patterns through systematic extraction and coding structures (Kıymalıoğlu et al., 2024; Kozik-Kołodziej, 2026).

Thematic Conceptual Synthesis

In the last stage, the chosen literature was integrated conceptually by themes. The analysis did not aim to aggregate numerical results, but rather to identify recurring constructs, relationships and conceptual tensions relevant to how sustainability is communicated and interpreted through packaging. The synthesis involved an iterative process of induction and deduction. Preliminary categories were derived from the study objectives and included visual cues of packaging, explicit sustainability information, perceived sustainability, trust and greenwashing. Further relationships were revealed in repeated comparisons of the literature matrix, such as the contrast between implicit visual sustainability cues and explicit informational sustainability cues, and the importance of congruence between the two modes of communication.

Five recurring conceptual themes were identified: **visual sustainability cues, explicit sustainability information, perceived sustainability, credibility and authenticity, and green trust versus perceived greenwashing**. A further cross cutting theme concerned the consistency between sustainability signals and supporting environmental information. This relationship was conceptualised as **cue congruence** and became the principal integrative mechanism within the proposed framework.

The synthesis was subsequently mapped onto the **Stimulus Organism Response model**. Packaging visual and informational cues were conceptualised as external stimuli; perceived sustainability, cue congruence, authenticity and greenwashing perceptions represented internal interpretive processes; and green trust and subsequent consumer responses represented outcomes. This procedure reflects the value of conceptual reviews in moving beyond description to identify relationships among previously fragmented concepts and develop new theoretical structures (Schreiber & Cramer, 2024). It is also consistent with recent methodological work demonstrating that conceptual frameworks can be developed by systematically synthesising concepts, identifying research gaps and organising relationships between previously dispersed theoretical perspectives.

Through this process, the literature review provided the evidential and theoretical basis for the proposed framework rather than assuming the framework in advance. The resulting model therefore represents an integrative synthesis of existing sustainable packaging, visual communication and green marketing research, while introducing cue congruence as a mechanism for explaining how packaging may generate either credible sustainability perceptions and green trust or, alternatively, perceived greenwashing.

Research Gap and Proposed Conceptual Framework

Research Gap

Research on sustainable packaging has increased rapidly in recent years, indicating a larger concern for packaging waste, circularity, environmental responsibility and sustainable consumption. Nevertheless, this growth has resulted in a literature that is concentrated in a few recurring areas. Kozik-Kołodziej (2026), in a systematic review of 78 studies published between 2019 and 2025, identified three major streams: consumer attitudes and behavioural determinants, willingness to pay for sustainable packaging, and perceptions of packaging materials and systems. Environmental awareness, perceived usefulness, trust in labelling, packaging functionality and price sensitivity repeatedly appear as determinants of sustainable packaging acceptance. Similarly, Kıymalıoğlu et al. (2024), through a systematic review of 63 studies using the Stimulus Organism Response framework, demonstrated that existing sustainable packaging research incorporates numerous packaging, marketing and external stimuli but remains theoretically fragmented. These findings indicate that significant progress has been made in explaining whether consumers accept sustainable packaging, yet comparatively less attention has been devoted to how consumers initially construct judgements about the credibility of sustainability communicated through packaging design.

A first gap therefore concerns the **fragmentation of visual sustainability cues**. Individual packaging characteristics such as colour, material, labels, visual complexity and minimalism have been shown to influence consumer perceptions. Berthold et al. (2024), for example, demonstrated that cardboard packaging generated stronger sustainability perceptions than plastic packaging, while Ding et al. (2024) found that minimalist

packaging could generate stronger green trust than visually complex alternatives. Lee and Yoo (2025) further investigated consumer perceptions of eco friendly packaging approaches involving material substitution, plastic reduction and printing minimisation. Collectively, these studies demonstrate that the visual and material characteristics of packaging influence environmental evaluation. However, such elements are commonly investigated independently or as individual experimental manipulations rather than conceptualised as components of an integrated visual sustainability communication system.

This fragmentation is significant because consumers encounter complete packages rather than isolated design variables. Colour operates alongside typography, material appearance, imagery, layout, certification marks, claims and disposal information. Thus, the meaning that one element produces may depend on the presence and interpretation of others. Granato et al. (2022) provide important evidence for this interaction by distinguishing between implicit and explicit sustainability signals. Their experiments showed that the combination of an implicit cue with explicit sustainability information can increase salience and perception of sustainability in some contexts. However, the same combination can be redundant or even counterproductive when the implicit cue already carries a strong sustainability meaning. Their results show that "more green cues" does not automatically lead to better sustainability communication.

The second gap concerns the distinction between perceived and evidenced environmental sustainability. In many situations consumers are asked to judge packaging where the technical environmental performance of the package cannot be directly verified. They therefore depend on heuristics and design cues that are readily visible. This makes it possible for packaging to look like it is environmentally responsible even if the visual appearance does not reflect actual environmental improvement. Leng (2025) experimentally demonstrated the problem by manipulating the colour of the packaging, keeping the products otherwise the same.

Respondents were more likely to evaluate green coloured packaging as environmentally sustainable, and this tendency was even observed among those with higher environmental literacy. The finding is particularly important as it shows that the sustainability perception can be altered by a purely visual manipulation without changing the environmental performance of the package itself. Similar perceptual effects are found for judgements other than direct sustainability. Ruan et al. (2026) found that eco-friendly packaging aroused more extensive positive inferences about food healthiness through ecological sensory associations, sustainability connotations and moral signals. Such results show that environmental packaging cues can cause a heuristic spillover into evaluations that are not direct measures of environmental performance. This highlights the need to distinguish between what sustainable packaging is from an environmental perspective and what sustainable packaging says from a visual perspective.

A third gap concerns the disconnect between visual cues and explicit evidence of sustainability. There has been increasing research on environmental labels, certifications and sustainability information. Using the Stimulus Organism Response model, Nguyen Quoc et al. (2025) found that eco labelling played a more important role in shaping young consumers' cognitive responses than green packaging and branding alone. In addition, Nguyen (2026) demonstrated that semiotic knowledge, which is the ability to interpret symbols in the environment, had a significant influence on young consumers' attitudes toward recycled packaging. These findings indicate that explicit information can provide cognitive evidence through which consumers interpret packaging sustainability. However, the relationship between such explicit evidence and the broader visual language of sustainable packaging remains insufficiently integrated theoretically.

A fourth gap concerns **how credibility is formed before green trust or perceived greenwashing emerges**. Recent studies have established that trust is critical in sustainable packaging decisions. Ashwini and Moodbidri (2026), through the TRUST PACT framework, showed that brand trust plays a central role in willingness to pay for sustainable packaging and that credible eco labels and transparent communication strengthen trust related outcomes, whereas perceived greenwashing risk weakens them. Similarly, recent empirical work has found relationships among sustainable packaging, green knowledge, green trust, attitudes, purchase intentions and purchasing behaviour. These studies advance knowledge regarding the consequences of credibility and trust. However, they largely begin from sustainability beliefs, trust related constructs or already recognised credibility

signals rather than explaining in detail how the visual design of packaging contributes to the initial formation of credibility or greenwashing judgements.

This differentiation is crucial as packaging frequently represents the initial consumer-facing context in which sustainability assertions are assessed. Before the consumer reads any formal sustainability claim they may view a package with natural colours, recycled paper look, restrained typography and environmental imagery. The package may also show an eco-label, recycling symbol or statement about recycled content at the same time. Depending on whether these elements reinforce each other or seem to be strategically manufactured, the consumer may judge the packaging as more or less credible. The visual design process therefore potentially precedes and contributes to the trust formation mechanisms emphasised in recent behavioural models.

A fifth gap relates to the separation between **environmental performance research and consumer experience research**. Zhang (2026) argues that sustainable packaging design continues to be characterised by separate streams evaluating environmental impacts through life cycle assessment and user experience through consumer, sensory, ergonomic and behavioural measures. The study calls for more integrated approaches capable of linking environmental performance with the consumer experience of sustainable packaging. For visual communication research, this division is particularly relevant because graphic design functions at the interface between environmental decisions made during packaging development and the environmental meaning subsequently understood by consumers.

Recent conceptual research also confirms the increasingly interdisciplinary nature of the field. Saud et al. (2026) developed a bibliographic coupling-based framework incorporating sustainable packaging, public engagement, behavioural factors, recycling innovation and communication related issues. While this contributes to a broader understanding of sustainable packaging research, a specific visual communication mechanism explaining how sustainability cues collectively become credible, or alternatively generate suspicion of greenwashing, remains underdeveloped.

In general, these gaps show that the main limitation is not the lack of research on sustainable packaging, visual cues, trust or greenwashing separately. Rather, there is a lack of an integrated explanation that connects these areas. Existing evidence suggests that visual characteristics can generate environmental associations, explicit information can improve sustainability understanding, and credibility can reinforce green trust. What is still insufficiently explained is the way in which consumers judge the consistency between the visual cues provided by the packaging and the sustainability information that it explicitly supports. In this paper we fill this gap by introducing the concept of cue congruence.

Conceptualising Cue Congruence in Sustainable Packaging

In this paper, we define cue congruence as the perceived consistency between implicit visual sustainability cues and explicit informational sustainability cues delivered via packaging. The idea does not presuppose that all sustainable packaging must employ stereotypically environmental aesthetics. But the issue is how different forms of communication combine to articulate a coherent and defensible environmental meaning. Implicit visual sustainability indicators convey meaning chiefly via perceptual and associative mechanisms. These are colour, typography, imagery, visual simplicity, texture, material appearance and other graphic or sensory attributes associated with environmental responsibility.

A good example is green; consumers may automatically associate it with nature and sustainability even without environmental evidence (Leng, 2025). Minimalist design also provides an implicit signal as visual restraint can reduce manipulation inference and improve green trust (Ding et al., 2024). The visual appearance of materials may also be an environmental cue. Sustainability can be read in cardboard, recycled textures or clearly reclaimed material. Explicit informational sustainability cues have a clearer environmental meaning. These include eco-labelling, environmental certification, sustainability claims, recycling symbols, disposal instructions, information on recycled content and traceability systems. Such cues may provide consumers with cues to evaluate the sustainability impression triggered by the visual design. But the effectiveness of these cues depends on both understanding and credibility. For example, Nguyen (2026) shows the importance of semiotic knowledge

for consumer reactions to recycled packaging, and Nguyen Quoc et al. (2025) suggest that eco labels could have stronger cognitive effects than general green branding cues. Cue congruence is when the two levels of communication support each other.

For example, a package using visible recycled content might include a label of verified recycled content and clear disposal information. The visual impression and explicit evidence are compatible in meaning. Conversely, a package dominated by green with natural imagery and ecological terminology, but not verifiable sustainability information can create a strong environmental impression without providing corresponding informational support. These situations are examples of low cue congruence, as the visual environmental meaning generated is greater than that of the evidence explicitly provided.

Granato et al. (2022) showed that implicit and explicit packaging cues interact, and the combination of these cues can either improve or reduce sustainability perception depending on the meaning already communicated by the cues. The present paper extends this logic from cue combination to cue credibility. In the proposed framework, consumers may evaluate not only the presence of sustainability cues but also their apparent mutual consistency. Therefore, cue congruence is proposed as an interpretive mechanism that links packaging design with perceived authenticity, green trust and greenwashing judgements.

Proposed Conceptual Framework

The proposed framework adjusts the Stimulus Organism Response model to clarify how sustainable packaging communication is perceived. The SOR model is particularly suitable because it separates external stimuli from their internal evaluations and subsequent consumer responses. While Nguyen Quoc et al. (2025) empirically applied SOR to green packaging, branding, and eco labelling, Kıymalıoğlu et al. (2024) showed through their systematic review that the model offers a helpful integrative structure for sustainable packaging research. The Stimulus part of the proposed framework consists of two interacting categories: implicit visual sustainability cues and explicit informational sustainability cues.

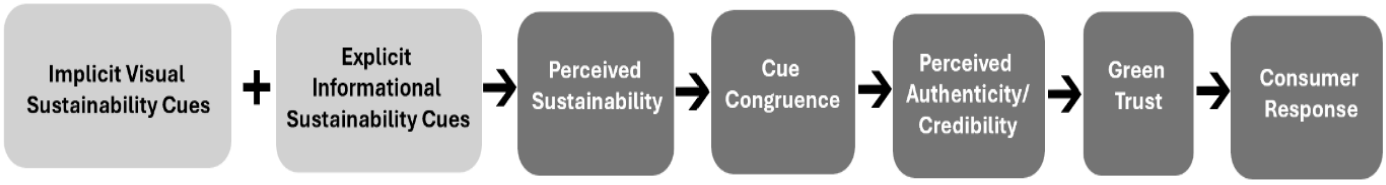
Implicit visual cues are colour, typography, imagery, material and texture appearance, minimalism and visual complexity. Examples of explicit informational cues include eco labels, certifications, environmental claims, recycling and disposal information, recycled content statements, and traceability information. The Organism component is the consumer's internal interpretation of these signals. The first interpretive outcome is **perceived sustainability**, reflecting the extent to which consumers judge the package to be environmentally responsible. This interpretation is followed by an assessment of **cue congruence**, through which consumers evaluate whether the sustainability impression produced by the design is consistent with the information and evidence presented. When congruence is high, consumers are expected to perceive stronger **authenticity and credibility**. When congruence is weak, ambiguous or contradictory, the same evaluative process may generate **perceived greenwashing**.

Green trust is positioned as a proximal credibility response arising from positive sustainability and authenticity evaluations. Although SOR studies vary in whether trust is treated as an organism state or behavioural response, the present framework conceptualises green trust as an intervening credibility mechanism linking interpretation to downstream consumer responses. This decision is supported by recent sustainable packaging research showing that trust helps convert favourable environmental evaluations into willingness to support sustainable packaging (Ashwini & Moodbidri, 2026). Perceived greenwashing forms the competing negative pathway because suspicion regarding environmental communication can erode the credibility necessary for trust formation.

The final **Response** component comprises broader consumer outcomes, including favourable brand attitude, packaging preference, purchase intention, willingness to pay and potentially sustainable post purchase behaviours. This structure moves beyond models that connect sustainable packaging directly with purchase intention by inserting a design centred credibility process between the packaging stimulus and behavioural response. This distinction is consistent with the latest systematic evidence indicating that sustainable packaging research has concentrated strongly on attitudes, willingness to pay and material acceptance, leaving scope for

deeper examination of the mechanisms through which sustainability meaning is created before those outcomes occur (Kozik-Kołodziej, 2026).

The proposed relationships may therefore be summarised conceptually as follows:



while an alternative negative pathway is proposed as:

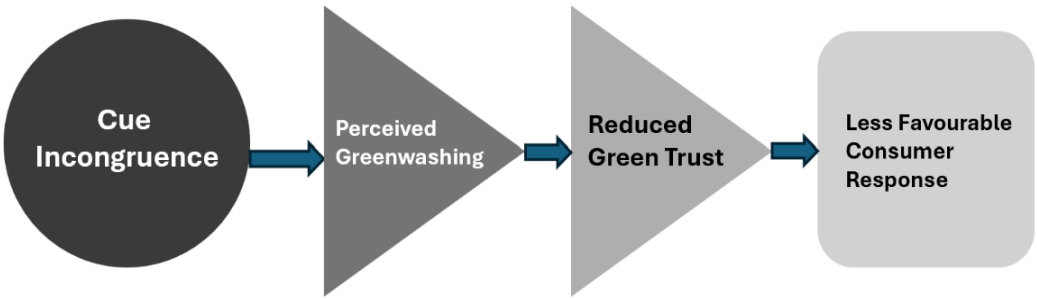


Figure 1. Proposed Conceptual Framework of Reliable Sustainability Communication in Packaging Design

The contribution of the framework is to position cue congruence as the binding mechanism between packaging aesthetics and sustainability credibility. Previous research shows that visual cues affect perception, explicit cues affect interpretation, and trust affects sustainable consumption. The proposed framework combines these streams by articulating how consumers may move from the perception of sustainability to the evaluation of the coherence of the sustainability message, to the decision to trust the message. The framework also differentiates credible sustainability design from sustainable looking design. A package may seem environmentally responsible but not have enough evidence to support that impression.

Leng's (2025) findings regarding green packaging colour demonstrate the ease with which visual sustainability inferences can be produced, while the 2026 systematic review by Kozik-Kołodziej emphasises the continuing importance of transparent communication and credible certification. The proposed framework therefore argues that effective sustainable packaging communication requires more than visual persuasion; it requires consistency between design signals and environmental evidence.

Finally, the framework complements emerging attempts to integrate environmental performance and user experience in sustainable packaging. Zhang (2026) identifies a persistent division between life cycle based environmental assessment and user centred packaging evaluation. Although the present framework does not attempt to measure lifecycle environmental performance directly, it provides a communication level mechanism that can connect environmental design decisions with consumer interpretation. In this sense, credibility depends not on making sustainable packaging visually “green” but on ensuring that the visual language through which sustainability is communicated is proportionate to, and consistent with, credible environmental evidence.

The proposed framework consequently provides the basis for developing a series of theoretical propositions concerning the relationships among implicit and explicit sustainability cues, perceived sustainability, cue congruence, authenticity, green trust, perceived greenwashing and consumer response. These propositions are developed in the following section.

Development Of Conceptual Propositions

Building on the proposed Stimulus Organism Response structure, this section develops the theoretical relationships among implicit visual sustainability cues, explicit informational sustainability cues, perceived sustainability, cue congruence, perceived authenticity, green trust, perceived greenwashing and consumer response. The propositions are derived from the literature synthesis rather than treated as empirically established relationships within the present study. Collectively, they explain how packaging may progress from creating an initial visual impression of sustainability to establishing credibility and trust or, alternatively, generating suspicion of greenwashing.

Implicit Visual Sustainability Cues and Perceived Sustainability

Consumers frequently make sustainability judgements before engaging deeply with written environmental information. Packaging colour, material appearance, typography, imagery, texture, visual simplicity and overall aesthetic treatment can therefore operate as implicit environmental signals. These signals are particularly influential because many aspects of environmental performance cannot be directly evaluated at the point of purchase.

Recent empirical evidence demonstrates the effect of such cues. Berthold et al. (2024) confirmed that material appearance works as a sustainability heuristic by showing that products presented in cardboard packaging were perceived as more sustainable than the same products presented in plastic packaging. Ding et al. (2024) also found that minimalist packaging had an influence on green trust, showing that visual simplicity can signal restraint and environmental responsibility while decreasing perceptions of manipulative design.

More directly, Leng (2025) found that changing product packaging to green increased the likelihood that consumers would identify the product as environmentally sustainable, even among respondents with stronger environmental literacy. These findings show that consumers do not need explicit environmental statements to develop sustainability impressions. Visual properties may automatically evoke associations related to the environment and thus affect the perceived sustainability of packaging. The strength of the individual visual cues could vary for product categories, cultural contexts and prior knowledge. However, the literature indicates that meaning can be constructed from packaging appearance in the environment. Therefore, the first proposition is stated:

P1: Implicit visual sustainability cues have a positive effect on consumers' perceived sustainability of packaging.

Explicit Informational Sustainability Cues and Perceived Sustainability

Implicit cues communicate by association, whereas explicit informational sustainability cues communicate environmental meaning more directly. Eco labels, sustainability claims, certification marks, recycling symbols, recycled content statements, disposal instructions and traceability information can help consumers to spot environmental characteristics that would otherwise remain invisible. Nguyen Quoc et al. (2025) discovered that eco labelling influenced young consumers' cognitive evaluations of environmentally oriented food and beverage products. Crucially, eco labelling had stronger cognitive effects than green packaging and branding alone, pointing to the possible significance of explicit, recognizable environmental information. Likewise, Nguyen (2026) showed that semiotic knowledge, which is the ability of consumers to read and interpret environmental symbols, has a significant positive impact on attitudes toward recycled packaging.

This result indicates that explicit information is important when consumers can decode and interpret the meaning of the signs provided. The presence of information, however, may not be sufficient. Explicit cues also need to be credible, understandable and relevant. Credibility enhancing conditions in sustainable packaging decisions are the credibility of eco-label and communication transparency (Ashwini & Moodbidri, 2026). Thus, explicit cues are expected to improve perceived sustainability particularly when they provide recognizable and credible evidence as opposed to vague and unsupported environmental terminology.

Accordingly, the second proposition is stated as follows:

P2: When the information is understandable and perceived as credible, explicit informational sustainability cues positively affect consumers' perceived sustainability of packaging.

Cue Congruence and Perceived Authenticity

The proposed framework posits that the efficacy of sustainable packaging communication cannot be explained by implicit and explicit cues. Consumers are exposed to these signals at the same time and may evaluate if the overall environmental message is internally consistent. Cue congruence is therefore the degree of congruence between visual sustainability impressions and explicit environmental information provided on the package. This relationship is supported by important evidence from Granato et al. (2022). Their experimental research revealed that explicit and implicit packaging cues do not just add effects but interact. Sustainability recognition can be enhanced by adding explicit information to an implicit visual cue that lacks established environmental meaning. But additional environmental information may be redundant or even counterproductive when the implicit cue itself already strongly signals sustainability. The results suggest that the relationship between cues is as important as the presence of individual cues. Steenis et al. (2023) examined discrepancies in claim facts and provided complementary evidence.

Consumers perceived greater levels of deception when environmental claims implied a greater level of sustainability than could be supported by the actual characteristics of the packaged product. Exaggerated sustainability communication may increase perceived sustainability, but it may also increase perceived deceptiveness. These results suggest that consumers are sensitive to the consistency between environmental impressions and supporting evidence. In the present framework, authenticity is expected to emerge when explicit evidence and visual presentation seem mutually supportive. For instance, a package that appears recycled and has explicit information about its recycled content and trustworthy certification will convey more coherence than a package that looks environmental but lacks evidence to support its environmental impression. Therefore, congruence should decrease the uncertainty regarding whether the package is communicating sustainability that is genuine or strategically manufactured.

Accordingly:

P3: Greater congruence between implicit visual sustainability cues and explicit sustainability information increases the perceived authenticity and trustworthiness of sustainable packaging communication.

Perceived Authenticity and Green Trust

Often, consumers find it hard to verify sustainability claims on their own. Trust becomes relevant where environmental claims are about hidden processes like sourcing of materials, how things are made, how well they can be recycled or how carbon is reduced. Perceived authenticity can reduce this uncertainty by signalling that sustainability communication is a portrayal of real environmental practice, rather than a symbolic marketing. Recent sustainability research supports authenticity-oriented cues and trust formation. Not specifically on packaging but on green agricultural products within the framework of livestreaming commerce, Pan et al. (2026) found visual authenticity to be a significant antecedent of green trust. The results indicated that information regarding authenticity had a greater impact than entertainment-oriented cues in trust formation, highlighting the role of credibility in the evaluation of environmental attributes that are difficult to verify directly by consumers. Similarly, in sustainable packaging Ashwini and Moodbidri (2026) highlight authenticity, verification and transparent communication as important for trust-based consumer decisions.

Their TRUST PACT framework demonstrates that decisions on sustainable packaging are made under conditions of information asymmetry and that credibility enhancing signals strengthen trust related behavioural outcomes. This supports the proposition that when consumers perceive packaging sustainability communication to be authentic, coherent and supported, the uncertainty surrounding environmental claims should decrease. Perceived authenticity is thus positioned as an important psychological bridge between cue congruence and green trust.

And consumers who see a package as genuinely conveying sustainability should have more confidence that the environmental information is trustworthy.

Thus:

P4: Perceived authenticity and credibility in sustainable packaging communication positively influence green trust.

Cue Incongruence and Perceived Greenwashing

When implicit visual cues and explicit sustainability evidence are incongruent, the opposite process may occur. Cue incongruence can arise when packaging is heavily dependent on environmental aesthetics and provides little evidence to support these cues, when claims are vague or exaggerated, or when visual impressions create a perception of greater environmental responsibility than is supported by the packaging attributes. Leng (2025) offers particularly significant support for this claim. In the assessment of identical items, aside from the green packaging, participants evaluated the product's environmental sustainability more favourably.

In the absence of significant environmental evidence, the study demonstrates that visual presentation alone can convey environmental meaning and that colour may be a way to encourage consumers to infer sustainability. Steenis et al. (2023) also found that the bigger the gap between sustainability claims and actual sustainability, the more people felt deceived. This is important because consumers may see and value the partial sustainability improvement and simultaneously see the communication as deceptive if the broader claims are not supported by the evidence.

Thus, positive environmental action does not necessarily protect a brand from greenwashing perceptions when the communication overstates its environmental importance. Moreover, Granato et al. (2022) showed that sustainability cues may generate scepticism instead of improving perception of sustainability if they are poorly combined or excessive. Taken together, these findings imply that perceptions of greenwashing may arise not only from demonstrably false claims, but also from disparities between the impression created by design and the information available to support this impression. Accordingly, the fifth proposition is stated as follows:

P5: Incongruence between implicit visual sustainability cues and explicit sustainability information increases perceived greenwashing.

Perceived Greenwashing and Green Trust

The perception of greenwashing immediately puts the credibility of sustainability at risk by compromising the trustworthiness of environmental communication. If consumers view environmental messaging as hyperbolic, strategically misleading or under-supported, they may lose confidence in individual claims, and in brand sustainability commitments more generally. The perceived risk of greenwashing is a credibility eroding condition in sustainable packaging decisions (Ashwini & Moodbidri, 2026).

Their findings indicate that the concerns of greenwashing diminish the potential of existing trust to foster consumers' willingness to pay for sustainable packaging. They also note that trust is built through credible eco labels and transparent communication, while greenwashing creates uncertainty about the sincerity of environmental communications. This relation is also relevant to packaging as environmental communication is often performed in highly compressed visual and textual environments.

Consumers may have limited time to decode symbols, materials, colours and claims. Thus perceived discrepancies can quickly lead to scepticism and influence subsequent assessments. Similarly, Steenis et al. (2023) found that perceived deception caused by claim-fact discrepancies decreased attitudes and purchase intentions. Perceived greenwashing is thus conceptualized as another negative credibility pathway in the proposed framework. Perceived authenticity enhances green trust, while perceived greenwashing diminishes it.

Therefore,

P6: Perceived greenwashing has a negative impact on consumers' green trust in sustainable packaging communication.

Green Trust and Consumer Response

Green trust is suggested as the key mechanism that explains how credible sustainability communication leads to positive consumer responses. Trust is especially important for sustainable products as consumers are often unable to verify environmental claims themselves. Confidence in an organization or product to deliver on its environmental commitments therefore reduces perceived uncertainty and allows sustainability beliefs to impact on behavioural decisions.

Packaging design can increase green trust (Ding et al., 2024). Brand trust is a central mechanism that translates environmental awareness, perceived benefits and green values into willingness to pay for sustainable packaging (Ashwini & Moodbidri, 2026). Positive environmental beliefs may not be enough to drive economic commitment unless consumers believe in the credibility of sustainability claims, according to the empirical analysis.

Recent research outside the immediate packaging context provides additional evidence for this behavioural role. Pan et al. (2026) found that green trust significantly influenced purchase intention and functioned as a central mechanism linking authenticity-oriented sustainability communication with behavioural outcomes. Similarly, recent sustainable packaging research continues to identify trust as an important factor connecting sustainability evaluation with willingness to pay and green purchasing behaviour.

For the present framework, consumer response is deliberately conceptualised broadly because credible packaging sustainability may affect several outcomes. These may include purchase intention, packaging preference, willingness to pay, brand attitude, recommendation intention and sustainable disposal or recycling behaviour. Future empirical studies can therefore test the framework using different response variables according to product type and research context.

The final proposition is advanced as follows:

P7: Green trust positively influences favourable consumer responses toward sustainably packaged products.

Summary of the Proposed Relationships

The seven propositions collectively describe two related pathways through which consumers may respond to sustainable packaging communication. The positive credibility pathway begins with implicit visual and explicit informational sustainability cues, progresses through perceived sustainability and cue congruence, and leads to perceived authenticity, green trust and favourable consumer responses. The negative pathway emerges when visual and informational sustainability cues are perceived as incongruent, increasing perceived greenwashing and subsequently weakening green trust.

The framework therefore proposes that successful sustainability communication depends not simply on whether environmental cues are present but on whether those cues form a coherent, supportable and credible environmental message. This distinction makes cue congruence the key factor in differentiating credible sustainable packaging communication from packaging that merely appears sustainable.

DISCUSSION

This paper set out to synthesise the literature on visual and informational sustainability cues, to examine conceptually how congruence between these cues shapes perceived sustainability, authenticity, green trust and perceived greenwashing, and to propose an integrated framework explaining these relationships. The Literature Review and Theoretical Foundation addresses the first objective by synthesising the literature into the implicit and explicit cue distinction. The Research Gap and Proposed Conceptual Framework and Development of

Conceptual Propositions sections address the second and third objectives by developing cue congruence as the interpretive mechanism connecting these cues to authenticity, trust and greenwashing judgements through the seven propositions.

Read together, the propositions describe two related pathways through which consumers may respond to sustainable packaging communication. The positive credibility pathway begins with implicit visual and explicit informational sustainability cues, progresses through perceived sustainability and cue congruence, and leads to perceived authenticity, green trust and favourable consumer responses. The negative pathway emerges when visual and informational sustainability cues are perceived as incongruent, increasing perceived greenwashing and subsequently weakening green trust.

The key interpretive step in the framework is to see authenticity and credibility as arising from the match between packaging's visual implications and the explicit evidence it provides, rather than from any count of sustainability cues a package conveys.

This reframes prior findings that treat implicit cues (Leng, 2025; Ding et al., 2024) and explicit cues (Nguyen Quoc et al., 2025; Ashwini & Moodbidri, 2026) as separately operating antecedents of consumer response: the present framework proposes that their joint configuration, rather than their separate presence, determines whether a package is judged credible or is perceived as engaging in greenwashing. This is consistent with, and extends, Granato et al.'s (2022) finding that implicit and explicit cues interact rather than combine additively, and with Steenis et al.'s (2023) claim fact discrepancy concept, which the present framework generalises from written claims to the wider visual and informational system of the package.

Theoretical Implications

The framework offers three principal theoretical contributions. First, it proposes cue congruence as a construct that can be examined independently of any single design element, allowing heterogeneous packaging cues such as colour, material, labels and claims to be compared on a common dimension, their mutual consistency, rather than only on their individual strength. Second, it repositions green trust and perceived greenwashing as outcomes of a shared antecedent process rather than as unrelated constructs; research on trust and research on greenwashing can draw on the same interpretive mechanism to explain both, whereas existing literature has largely addressed them in parallel rather than through a common lens (Ashwini & Moodbidri, 2026; Steenis et al., 2023). Third, by embedding this mechanism within the Stimulus Organism Response model, the framework extends prior sustainable packaging applications of SOR (Kıymalıoğlu et al., 2024; Nguyen Quoc et al., 2025) by specifying an intermediate interpretive stage, cue congruence, between the initial perception of sustainability and the trust or scepticism that follows, addressing the theoretical fragmentation that Kıymalıoğlu et al. (2024) identify within existing SOR-based research.

Practical Implications

For designers and brand sustainability teams, the framework proposes three practical considerations as credibility of sustainability cannot be created through visual styling alone. First, design teams should audit packaging holistically rather than cue by cue, checking whether the overall visual impression created by colour, material, imagery and minimalism is proportionate to the explicit evidence available through certifications, verified claims and traceability information, since Granato et al. (2022) show that adding cues to an already strong implicit signal can be redundant or counterproductive rather than reinforcing. Second, because explicit information is effective only when it is understood (Nguyen, 2026) and, as the eye tracking evidence reviewed under Explicit Informational Sustainability Cues indicates, only when it is actually noticed (Hoffmann et al., 2025), practitioners should prioritise the legibility and visual prominence of labels and claims rather than assuming that their mere presence on the packaging is sufficient. Third, organisations should treat visual sustainability styling as a claim requiring substantiation in the same way a written environmental claim does; Steenis et al. (2023) demonstrate that consumers penalise a gap between claims and evidence even when partial environmental improvement is genuinely present, and the same logic applies to a gap between visual impression and evidence.

These implications remain practical extrapolations from the conceptual framework rather than tested prescriptions and should be treated accordingly until the framework is empirically validated.

Limitations And Future Research

The proposed framework offers an integrated explanation of how sustainable packaging visual cues, informational cues, cue congruence, green trust and perceived greenwashing may interact. Several limitations should, however, be noted. First, the framework is conceptual and has not been tested empirically. The proposed relationships are based on synthesis of extant literature and not primary consumer data. The propositions are grounded in theory, but the strength, direction, and boundary conditions of the relationships require empirical testing. This is particularly important because recent research on sustainable packaging has shown that trust, environmental credibility, and behavioural responses may vary depending on consumer characteristics, cultural context, and type of packaging evaluated (Ashwini & Moodbidri, 2026).

Future research should therefore empirically test the proposed framework, using quantitative, experimental or mixed method designs. Second, the literature corpus was purposely targeted to recent, peer reviewed and mostly open access research published between 2020 and 2026. This approach enhanced accessibility and guaranteed focus on current developments but may have overlooked relevant studies available only through subscription databases, or earlier foundational research outside the review period. Moreover, the review included studies using different methodologies, product categories and national contexts. Thus, the conceptual synthesis captures the recurring theoretical patterns across heterogeneous evidence, rather than estimating effect sizes directly. Future research could build on the present review by undertaking a fully systematic review or meta-analysis that draws on broader bibliographic databases, includes explicit duplicate handling, and follows formal quality assessment procedures.

Third, the proposed framework classifies packaging cues into two broad categories: implicit visual sustainability cues and explicit informational sustainability cues. Among the design variables are heterogeneous categories such as colour, typography, material appearance, imagery, minimalism, eco labels, sustainability claims and traceability information. Their relative impact may be very different. Recent evidence suggests that perceptions of sustainable packaging may be impacted by material, visual appearance and usability and consumer priorities in different ways, and that designers need to balance the requirements for sustainability with those for functionality, convenience and aesthetic acceptance (Espineda et al., 2025; Zhang, 2026). Future empirical research should therefore test individual design cues as well as combinations of cues, rather than assuming equivalent effects across all packaging characteristics.

A particularly important direction for the future concerns the empirical validation of cue congruence. Experimental research can create controlled packaging stimuli in which implicit visual sustainability cues and explicit sustainability information are systematically manipulated. For example, researchers might compare packaging with strong environmental aesthetics and proven sustainability evidence to packaging with the same aesthetics but without supporting information. Other experimental conditions could manipulate eco labels, recycled material appearance, colour, typography, minimalism or environmental claims. These experiments would allow for causal testing of whether congruent communication increases perceived authenticity and green trust and, conversely, incongruent communication increases perceived greenwashing.

Experimental approaches would also address recent calls for designs that go beyond self-reported intentions and allow for stronger causal inference in sustainable packaging research (Ashwini & Moodbidri, 2026). Further research should also differentiate between perceived sustainability and actual environmental performance. Zhang (2026) points out the persistent separation between environmental assessment and user experience within the context of sustainable packaging research. Future research could therefore combine consumer evaluations with objective sustainability indicators such as life cycle assessment, material recyclability or verified environmental certification. This would make it possible to assess if packaging that is perceived by consumers as highly sustainable is indeed associated with better environmental performance, and to identify cases where visual impressions do not match the environmental evidence.

Another important direction is cross cultural validation. Today's evidence comes from a variety of contexts – Europe, China, India and Southeast Asia – but environmental meanings and trust mechanisms may differ between markets. Ashwini and Moodbidri (2026) explicitly warn that the results of their Indian Generation Z cannot be automatically generalised to other generations, regulatory environments and cultural contexts. Hence, the proposed framework needs to be tested across different age groups, product categories and national populations. Malaysia is a particularly valuable setting due to its multicultural consumer setting and growing discourse on sustainability. An empirical Malaysian study could investigate whether consumers interpret colour, material appearance, eco labels and sustainability claims in a consistent manner across demographic or cultural groups.

Further research should also go beyond purchase intention. Ultimately sustainable packaging performance is driven by behaviours such as correct disposal, recycling, reuse, willingness to return packaging and actual purchase decisions. Future studies could therefore employ behavioural measures, longitudinal observation, eye tracking or choice experiments rather than relying solely on cross sectional self-report data. Recent research on sustainable packaging calls for a stronger integration of environmental performance, user experience and observable consumer behaviour (Zhang, 2026).

Finally, the conceptual framework could be developed into an applied design evaluation tool in future research. Early-stage decision making tools have been developed in existing work to help packaging designers assess environmental sustainability during concept development (Xu et al., 2025). Building upon these approaches, a future sustainability communication congruence checklist or design evaluation scale could assess whether the environmental impression created by colour, material, typography, imagery and layout is adequately supported by claims, certifications and traceability evidence. Such a tool could help the framework to go from theoretical explanation to practical application for graphic designers, packaging designers and brand sustainability teams. To summarize, the limitations of the present conceptual paper clearly delineate an agenda for empirical development. A key next step is to examine the proposed relationships between visual and informational cues, cue congruence, perceived authenticity, green trust and perceived greenwashing. This would indicate whether the framework is capable of consistently differentiating between packaging that credibly communicates sustainability, and packaging that merely wears the look of sustainability.

CONCLUSION

In research and practice, demand for sustainable packaging is increasing as organisations attempt to minimise their environmental impacts and meet increasing consumer expectations for responsible production and consumption. However, consumers judge not only the sustainability of packaging based on technical or environmental performance. To be effective, the environmental message communicated through packaging must be perceived, decoded and evaluated by consumers. Previous research shows that packaging's material look, colour, minimalist design, environmental labels, sustainability claims, and other features can influence perceptions of environmental responsibility, trust, and behavioural responses (Berthold et al., 2024; Ding et al., 2024; Nguyen Quoc et al., 2025).

Meanwhile, recent systematic evidence suggests that consumer attitudes, willingness to pay, material preferences and behavioural outcomes remain dominant in sustainable packaging research, which leaves room for a deeper investigation on the communication processes employed to build sustainability credibility (Kıymalıoğlu et al., 2024; Kozik-Kołodziej, 2026). This conceptual paper addresses this gap by arguing that sustainable packaging should be seen not only as a physically improved environmental object, but also as a visual and information communication system. The framework distinguishes between implicit visual sustainability cues (e.g. colour, typography, imagery, material appearance, texture, minimalism and visual complexity) and explicit informational sustainability cues (e.g. eco labels, certifications, sustainability claims, recycling information, disposal instructions and traceability evidence).

There is evidence that both forms of communication can affect interpretations of the environment, although their effects are not necessarily independent or automatically positive. For example, Granato et al. (2022) found that implicit and explicit packaging cues can be both complementary and redundant or even counterproductive based on context. The main theoretical contribution of this paper is that we suggest cue congruence as a mechanism

linking packaging visual design with sustainability credibility. Cue congruence is the perception of consistency between environmental information (supporting environmental meaning) and visual input (conveying environmental meaning). The framework suggests that congruent sustainability communication increases perceived authenticity and green trust.

Conversely, incongruence between visual cues for sustainability and supporting evidence for environmental claims increases perceived greenwashing. This proposition is based on prior research on claim fact discrepancy, where it is shown that consumers may consider environmental communication as deceptive, when sustainability claims are made that go beyond the environmental performance that they intend to represent (Steenis et al., 2023). This distinction is especially pertinent because recent research has demonstrated that environmental meaning can be constructed on the basis of visual appearance alone. For example, green colour packaging may improve the perceived environmental sustainability without the actual environmental change (Leng, 2025). Similarly, consumers might rate some materials or minimalist visual treatments higher in sustainability. The findings suggest that packaging can be perceived as sustainable but not necessarily more sustainable, which poses a major ethical and design challenge for contemporary environmental communication.

Based on the Stimulus Organism Response model, the proposed framework identifies implicit visual cues and explicit informational cues as stimuli related to sustainability, and perceived sustainability, cue congruence, authenticity and greenwashing perceptions as internal interpretive processes. Green trust then links these judgements to broader consumer responses such as brand attitudes, packaging choices, purchase intentions, and willingness to endorse products with sustainable packaging. This builds on previous SOR based sustainable packaging models by incorporating a more complex visual communication and credibility process rather than treating sustainable packaging as a single undifferentiated stimulus (Kıymalıoğlu et al., 2024).

The framework also complements recent trust based sustainable packaging research. Ashwini and Moodbidri's (2026) study found that consumer responses are negatively affected by perceived greenwashing, whereas credible eco labels, transparency in communication, and brand trust are important factors in sustainable packaging decisions. The present study extends this logic by suggesting that trust and greenwashing judgements may be partly derived from the design relation between environmental aesthetics and explicit evidence. Graphic design is thus not only an aesthetic component of sustainability communication, but part of the process through which environmental credibility is constructed. The framework suggests that designers and organisations need to move beyond designing packaging that looks environmentally friendly, in practical terms.

Sustainable packaging communication needs to be credible, meaning that environmental performance should be consistent with its appearance and the information conveyed. Design cues should allow consumers to recognise real sustainability benefits and labels; certifications and environmental information should reinforce and not only decorate the environmental message. This perspective is consistent with recent research that advocates for improved integration of environmental performance and user experience in sustainable packaging design (Xu et al., 2025; Zhang, 2026). The relationships suggested in the conceptual study must be empirically confirmed.

Future research should therefore test the seven propositions developed in this paper in different product categories, consumer groups and cultural contexts. Visual cues and sustainability evidence could be manipulated in controlled experiments to test the relationships between congruence between cues and perceived authenticity and green trust, and incongruence between cues and perceived greenwashing. Cross cultural studies such as research among Malaysian consumers could further identify whether interpretations of cues of sustainable packaging are different across cultural and demographic groups.

To summarize, the paper argues that the credibility of sustainability communication is not determined by the number of environmental signals in packaging, but rather by the consistency between what packaging appears to communicate and what the environmental evidence can confirm. This research integrates visual communication, sustainability perception, cue congruence, authenticity, green trust and perceived greenwashing into a comprehensive conceptual model and contributes to a future research agenda on the role of graphic design in sustainable communication that is persuasive, yet transparent, substantiated and credible.

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