

Sensing the Green: Leveraging Sensory Cues to Overcome Barriers in Green Product Perception

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Abstract. Green products face persistent consumer skepticism rooted in stereotypes such as “green equals to inefficient, unpalatable, or high price.” This paper examines how sensory marketing, which was grounded in the embodied cognition theory, can be strategically deployed to counteract these biases and reshape consumer evaluations of green offerings. Drawing on empirical research across visual, tactile, olfactory, auditory, and gustatory domains, this study illustrates how sensory cues such as matte packaging, rough textures, natural scents, or crisp sounds can translate abstract environmental attributes into tangible, experiential signals that enhance perceived health, efficacy, pleasure, authenticity, and affordability. Moreover, it proposes a multisensory design framework that not only reinforces the positive “health halo” of green products but also actively mitigates functional, hedonic, trust-related, and price-related barriers. This systematic analysis offers actionable guidance for marketers and product designers seeking to align sensory experience with sustainability narratives, thereby fostering more favorable consumer perceptions and accelerating the adoption of green products in competitive markets.

Keywords: Sensory Marketing, Green Product, Embodied Cognition, Consumer Perception, Multisensory Design

1. Introduction

Despite growing attention on sustainable consumption, green products continue to face persistent consumer skepticism regarding their functionality, taste, and value. The sensory marketing perspective offers a promising approach to these challenges, as it can translate often-intangible attributes such as sustainability into concrete, tangible, and experientially verifiable impressions [1]. However, existing sensory marketing research has yet to systematically examine how multisensory design can overcome such adoption barriers, revealing a notable gap. Grounded in embodied cognition, this paper examines how strategically designed multisensory cues like visual, tactile, olfactory, auditory, and gustatory can reshape consumer perceptions of green products. Specifically, it explores how these cues can enhance perceived health, efficacy, pleasure, authenticity, and affordability, thereby improving consumers’ core evaluations of green offerings. By synthesizing cross-disciplinary empirical findings, it develops a tailored multisensory design framework for green products. Theoretically, this study extends sensory marketing into the domain of sustainable consumption and enriches related theoretical frameworks. Practically, it provides actionable

multisensory strategies for green product design and marketing, helping to counter consumer biases, increase competitiveness and adoption, and accelerate the shift toward sustainable consumption patterns.

2. Research status and mechanisms of sensory marketing

2.1. Theoretical foundation: how the senses influence judgment

The influence of sensory experiences on abstract judgment in consumer behavior is explained by embodied cognition, which posits that thinking, judgment, emotion, and memory are integrally connected with the physical attributes of the body, sensory experiences, and real-time interactions with the environment [1]. Empirical evidence shows that bodily interactions can shape evaluations [2]. This process often involves metaphorical mapping from physical to abstract domains. For example, physical warmth increases perceptions of social warmth [3]. The mechanism can be understood as mental simulation, where sensory inputs activate related concepts to influence judgment [4]. By synthesizing this framework, existing research demonstrates that sensory cues like weight, roughness, or warmth are directly translated into abstract judgments about product quality, interpersonal kindness, or task difficulty through this embodied metaphorical architecture [1].

2.2. Sensory cues & consumer judgment

2.2.1. Vision

In sensory marketing, visual cues systematically shape consumer perception and judgment through multiple specific design dimensions, including color, shape, visual texture, imagery and symbols.

Regarding color, color saturation significantly influences consumer judgment. High saturation can amplify the perceived size of a product, effectively conveying a sense of “sufficiency”, while low saturation tends to evoke associations with the “passage of time,” helping to enhance the perceived status and classic appeal of luxury brands [5,6]. In terms of shape, product form itself serves as a metaphorical language. Rounded shapes are generally associated with sweetness and harmony, whereas angular shapes are more likely to evoke perceptions of sourness, stimulation, or potency [7]. As for visual texture, the glossiness of packaging directly affects inferences about product attributes. Research shows that matte packaging is often linked to healthy snacks, thereby strengthening health perception and increasing consumption, whereas glossy packaging is more commonly used for unhealthy snacks, creating a distinct contrast [8]. Concerning imagery and symbols, visual designs quickly communicate brand and product information. Consumer preference typically peaks at a moderate level of market-segment typicality and brand consistency [9]; however, it should be noted that overly simplistic designs may trigger a “low-cost” stereotype, thereby reducing willingness to pay [10].

2.2.2. Tactile sensation

Research in the tactile dimension of sensory marketing shows its influence permeates the entire process from external touch to internal tasting. First, external tactile cues have a cross-modal transfer effect. For instance, non-diagnostic tactile features like the hardness of a product container can directly affect consumer judgments of the product’s intrinsic attributes, with this effect being more pronounced for consumers with lower tactile needs [11]. Second, intra-oral tactile experiences directly shape perceptions of health and calories. The soft and smooth texture of food leads to higher

calorie estimates, while hot food spontaneously triggers the intuitive inference of “higher calories” [12,13].

2.2.3. Olfaction

At the level of sensory interaction, olfaction as the sensory system that detects odor molecules through the nasal cavity plays a role that extends beyond mere odor perception and can significantly modulate other sensory experiences. Research shows that a product’s scent can directly influence consumers’ tactile perception of its texture and temperature. When the scent is semantically congruent with the tactile sensation, it can enhance tactile sensitivity and improve overall product evaluation [14].

2.2.4. Audition

In the auditory dimension of sensory marketing, sound can shape both microscopic product perception and macroscopic persuasive effects. On one hand, the symbolic meaning of sound directly affects consumer expectations through cross-modal mapping. For example, the pronunciation of high-pitched tones and hard consonants in brand names can unconsciously evoke specific taste or texture associations like sourness and crispness, providing a linguistic tool for establishing accurate sensory expectations [7]. On the other hand, having multiple voices narrate the same message sequentially can effectively capture and sustain consumer attention, facilitate information processing, and significantly enhance persuasion, which is a mechanism known as the “voice numerosity effect” [15].

2.2.5. Taste

Taste refers to the sensory system that detects the chemical properties of food such as sweetness, sourness, bitterness, saltiness, and umami, through taste buds in the mouth. In addition, consumers’ taste experience is not only influenced by information but also by their immediate physical state. Research has expanded the boundaries of sensory marketing to include the vestibular system, revealing that eating while standing induces greater physiological stress on the body, reduces sensory sensitivity, and consequently leads to lower evaluations of tasty food compared to eating while seated [16].

3. Green products vs. ordinary products (the specificity of green products)

3.1. Definition and characteristics of green products

A green product is one that, throughout its life cycle stages (design, production, use, recycling, or disposal), significantly reduces resource consumption, energy use, pollution emissions, and ecological damage, or actively improves environmental quality. Its environmental performance surpasses that of traditional products and may even offset the environmental burden of other products [17]. Green products possess an altruistic nature, offering moral value and emotional rewards to consumers who contribute positive externalities to the environment and society through their purchase. They also carry credence attribute. The core environmental benefits of “green” are often intangible and difficult for consumers to verify, making them reliant on trust in the brand, certifications, or claims to accept the authenticity of these benefits. This inherent characteristic makes green claims susceptible to consumer skepticism regarding “greenwashing.”

3.2. Advantages of green products

The market advantages of green products stem primarily from positive inferences and perceptions they generate among consumers. Consumers may develop a favorable “halo effect” towards products with environmental attributes, a process grounded in the theoretical mechanism where sensory experiences directly translate abstract qualities into positive judgments [1]. In the food domain, green labels e.g., organic or natural can strengthen positive consumer evaluations regarding health, safety, and purity. Furthermore, specific sensory cues, such as matte packaging, can effectively reinforce the inference that a green product is “healthier,” thereby enhancing its appeal [5]. However, the advantage of green attributes is conditional. In certain product categories, they may trigger the “sustainability liability” a negative inference that “green is less effective” [18]. Therefore, appropriate marketing strategies are required to shape and validate these product advantages.

3.3. Disadvantages (barriers) of green products

Green products face significant market disadvantages rooted in consumer cognitive biases. First, regarding functionality, consumers commonly believe that a product’s environmental attributes come at the expense of its core functional efficacy a manifestation of the “sustainability liability,” such as the perception that ecofriendly detergent cleans less effectively [18]. Second, widespread consumer skepticism about corporate “greenwashing” false or exaggerated environmental claims undermines the credibility of green propositions. This skepticism is fundamentally linked to the inherent “trust attribute” of green products [17]. Third, concerning hedonic value, consumers often hold the belief that healthy green food tastes worse or that eco-friendly materials have an inferior feel [19]. Finally, the high price premium associated with green products deters many consumers [18].

4. Application strategies of sensory cues in green product design (synthesis)

4.1. Strategy for enhancing advantages

While green labels provide cognitive health inferences, compelling sensory experiences can elevate this cognition to experiential conviction. Visually, incorporating natural wood tones can evoke associations with “pure, unrefined.” Tactilely, preserving or highlighting the gentle roughness, unique texture, or solid weight of ecofriendly materials serves as tangible evidence of being “non-synthetic” [11]. For instance, a “best enjoyed chilled” label on packaging can guide consumption at lower temperatures, thereby reducing perceived calorie content and aligning with “low calorie” intuition [13]. Auditorily, emphasizing the “crisp” sound of food in the mouth can convey freshness and nutrition [7]. Olfactorily, using natural scents helps consumers to perceive freshness and health [14].

4.2. Strategy for countering functional bias

To change the ingrained stereotype that green products are less effective, companies can strategically use sensory marketing to translate abstract altruistic attributes into concrete signals of efficacy. This involves incorporating citrus or mint scents with “fresh” and “penetrating” associations on an olfactory level [14]; adjusting liquid viscosity or packaging hardness to imply concentration and strength at the tactile level [11]; and using high contrast colors and bold, angular

lines rather than overly soft styles on a visual level [7]. The synergistic effect of these multisensory cues enhances the user experience.

4.3. Strategy for countering hedonic bias

To alter the prejudice that healthy green food is “bland and unpalatable,” sensory cues can be strategically employed to reshape expectations of deliciousness and satisfaction without compromising the product’s healthy core. Visually, increasing the saturation of warm tones in packaging leverages the “warm color is equivalent to delicious” synesthetic hint to suggest pleasure and satisfaction [5]. Auditorily, designing a crisp package-opening-sound or highlighting the product’s inherent crunchiness in marketing conveys freshness and high quality [7].

4.4. Strategy for building trust

To address consumer skepticism about “greenwashing,” sensory cues can strategically transform abstract, unverifiable environmental promises into instinctive, perceptible authenticity hints. Tactilely, using packaging paper with a rough texture directly activates consumers’ mental schemas of “natural” and “unprocessed,” increasing trust in the product’s origin and environmental claims [11]. Visually, employing matte rather than glossy finishes effectively communicates “understated,” “rustic,” and “less artificially modified” sensory impressions, aligning with a natural, authentic brand narrative [8]. This makes the product’s green qualities feel “touchable” and “tangible,” building credibility on an emotional level and bridging the cognitive gap created by the inherent trust attribute.

4.5. Strategy for mitigating price barrier

To counteract the entrenched perception that green products are “severely overpriced” and enhance their perceived affordability, high-saturation colors can be strategically used in packaging and visual communication [5]. These bright, vibrant colors quickly attract attention and convey psychological hints of “efficiency,” “vitality,” and “good value.” They are commonly associated with mass-market, accessible consumer brands, which can subconsciously weaken the “eco-friendly is luxurious and expensive” stereotype and instead foster a more pragmatic and accessible brand image.

5. Conclusion

This paper indicates that sensory marketing, grounded in embodied cognition, offers a potent strategy for reshaping consumer perceptions of green products. By designing multisensory cues across visual, tactile, olfactory, auditory, and gustatory domains, the sustainability attributes of green products can be translated into tangible, experiential signals that positively influence judgments and behaviors. This approach helps overcome consumer biases, making green products perceived as a sensorially appealing and emotionally rewarding choice, thereby promoting a more sustainable consumption pattern. Theoretically, this study extends sensory marketing to sustainable consumption, demonstrating how metaphorical mappings and cross-modal interactions can bridge the gap between credence attributes and consumer trust. It also enriches the discourse on embodied cognition by showing how sensory cues can materially reshape inferences about product effectiveness, authenticity, and pleasure. Practically, this paper provides a structured, multisensory design framework for marketers and product developers. By identifying actionable strategies such as employing tactile roughness, matte visuals, natural scents, crisp sounds, and calibrated temperature

cues, marketers and product developers can create green products that are both ecologically sound and sensorially appealing. These products, in turn, can enhance market acceptance and competitive differentiation. However, as most supporting evidence comes from controlled experimental settings, the long-term effects and real-world impact of such sensory interventions on brand loyalty and repeated consumption warrant further longitudinal study. Besides, sensory associations with “greenness” and naturalness may vary across cultures, highlighting the need for cross-cultural research to refine context-sensitive design principles. As digital interfaces and immersive technologies advance, future research should explore how digital sensory cues like augmented reality visuals, haptic feedback, and digital ambient scents can enhance the virtual experience and perceived authenticity of green products. In addition, differences in sensory sensitivity, environmental concern, and product familiarity may moderate the effects, offering another valuable avenue for further segmentation and personalization in green sensory marketing.

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