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# A conceptual model of green e-commerce user interface/ user experience design toward enhancing brand image

Ni Wayan Sukartini, Kadek Cahya Dewi*, Nyoman Indah Kusuma Dewi
Department of Business Administration, Politeknik Negeri Bali, Indonesia

*) Corresponding Author (e-mail: cahyadewi@pnb.ac.id)

**Abstract**

Green e-commerce is a growing driver of sustainable consumption, yet communicating sustainability values through User Interface and User Experience (UI/UX) design remains limited. Most studies address green features or behavior in isolation, leaving a gap in integrating systematic design approaches with behavioral models. This study develops a conceptual model for UI/UX design in green e-commerce toward enhancing brand image. A qualitative content analysis approach was employed, triangulating observations of three purposively selected platforms, semi-structured interviews with nine participants (three SME owners and six users), literature reviews, and expert Focus Group Discussions (five domain experts). Data were analyzed through thematic coding guided by Design Thinking stages and the Fogg Behavior Model (FBM). The findings identify five key UI/UX principles: eco-friendly design, transparency, gamification, personalization, and behavioral nudges, each linked to FBM components of motivation, ability, and prompt. The resulting model offers SMEs a practical framework to strengthen green brand credibility and reduce greenwashing risk. Empirical validation through usability experiments is recommended for future research.

Keywords: Green E-Commerce, Green UI/UX, Green Brand Image, Design Thinking, Fogg Behavior Model.

**Abstrak**

Green e-commerce merupakan pendorong konsumsi berkelanjutan yang terus berkembang, namun upaya mengkomunikasikan nilai keberlanjutan melalui desain antarmuka dan pengalaman pengguna (UI/UX) masih terbatas. Sebagian besar penelitian membahas fitur hijau atau perilaku pengguna secara terpisah, sehingga terdapat kesenjangan dalam mengintegrasikan pendekatan desain sistematis dengan model perilaku. Penelitian ini mengembangkan model konseptual desain UI/UX pada green e-commerce untuk memperkuat brand image. Pendekatan qualitative content analysis diterapkan melalui triangulasi observasi tiga platform, wawancara semi-terstruktur dengan sembilan partisipan (tiga pemilik UMKM dan enam pengguna), tinjauan literatur, dan Focus Group Discussion (FGD) bersama lima pakar. Data dianalisis melalui pengkodean tematik berdasarkan tahapan Design Thinking dan Fogg Behavior Model (FBM). Temuan mengidentifikasi lima prinsip UI/UX utama: desain ramah lingkungan, transparansi, gamifikasi, personalisasi, dan dorongan perilaku, yang masing-masing dikaitkan dengan komponen FBM: motivasi, kemampuan, dan pemicu. Model ini menyediakan kerangka praktis bagi UMKM untuk memperkuat green brand credibility dan meminimalkan risiko greenwashing. Validasi empiris melalui eksperimen usabilitas disarankan untuk penelitian selanjutnya.

Kata kunci: *Green E-Commerce, Green UI/UX*, Citra Merek Ramah Lingkungan, Design Thinking, Model Perilaku Fogg.

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## 1. Introduction

Rapid technological developments are a major factor driving businesses to adopt the digital economy, aiming to provide faster, more economical, and better services (Ammeran et al., 2023). Digital transformation plays a crucial role in the business world, and the digital economic model has been utilized by Small and Medium Enterprises (SMEs) to adapt to change (Dewi et al., 2022; Dewi & Ayuni, 2021)

Various business opportunities in the green living sector are starting to become a trend, indirectly increasing young people's awareness of green living while creating new business opportunities (Suhartanto et al., 2022). Green innovation is pivotal to enhancing sustainability outcomes and maintaining competitive advantage, and has become a prominent topic in sustainability and environmental performance research (Arsawan, Azizah, et al., 2024; Doguchaeva et al., 2022; Koval et al., 2023; Wernbacher et al., 2023; Yang et al., 2023; Zhai et al., 2025; Zhou & Duan, 2022).

SMEs play a significant role in circular economy practices. Arsawan et al. (2024) found that collaboration between the triple helix, namely government, SMEs, and the community, is necessary to raise environmental awareness toward sustainability. Koval et al. (2023) further argue that the transformation toward green business requires the contribution of all organizational elements and an innovative approach. When individuals consistently exhibit pro-environmental behaviors in their daily activities, these practices collectively foster a green organizational culture, which in turn shapes environmentally oriented strategies (Arsawan, Koval, et al., 2024; Koval et al., 2023).

SMEs operating in the green business sector can publicize their businesses through e-commerce platforms. In this digital era, it is crucial to display green content and features on e-commerce platforms to enhance brand image. However, such content must not be detected as greenwashing. Greenwashing refers to businesses that deceive users, customers, and investors into believing that their business model is environmentally friendly when it is not (Delmas & Burbano, 2011; Vangeli et al., 2023). Studies detecting greenwashing have largely focused on textual or strategic disclosure aspects rather than UI/UX design (Vangeli et al., 2023).

A critical gap in the literature lies in the absence of a conceptual model that addresses UI/UX design specifically for green e-commerce. While prior studies have explored frameworks for green innovation and green technologies, little attention has been given to how UI/UX elements can communicate authenticity, reinforce sustainable brand identity, and mitigate the risk of greenwashing in digital platforms. Addressing this gap is crucial for SMEs, whose credibility and competitiveness depend heavily on consumer perception. For the purposes of this study, brand image is operationally defined as the set of consumer perceptions and associations regarding a brand’s environmental credibility, trustworthiness, and alignment with sustainability values, as communicated through digital platform design. Therefore, this study aims to develop a conceptual model for UI/UX design in green e-commerce that contributes to strengthening the brand image of SMEs engaged in green business, while

simultaneously reducing the potential for greenwashing in digital environments. To guide this inquiry, two research questions are posed: (RQ1) What UI/UX design principles are most salient for communicating sustainability authentically in green e-commerce contexts? (RQ2) How do these UI/UX principles interact with user behavioral triggers, motivation, ability, and prompt to support green brand credibility and reduce greenwashing perception?

The novelty of this study lies in the integration of three distinct frameworks into a single actionable conceptual model specifically designed for the context of green e-commerce. These three frameworks namely Design Thinking, green UI/UX principles, and the Fogg Behavioral Model. The proposed model contributes a theoretically grounded and behaviorally informed conceptual mechanism that bridges sustainability communication, persuasive interface design, and user behavioral response. This shifts the discourse from static framework integration toward a dynamic explanatory model capable of describing how green UI/UX design constructs perceived authenticity and suppresses greenwashing perception in digital commerce ecosystems.

## 2. Literature Review

### Green E-Commerce and Sustainability Communication

Green e-commerce refers to digital commerce platforms that integrate environmental values into their operations, products, and communications (Wernbacher et al., 2023). The growing consumer demand for sustainable products has accelerated the adoption of green features in e-commerce platforms, including eco-certifications, carbon footprint calculators, and sustainable packaging disclosures (Doguchaeva et al., 2022; Yang et al., 2023). However, communicating these values authentically without risking greenwashing accusations remains a challenge. Research confirms that an informative and honest UI drives green trust and increases the likelihood of eco-friendly purchases (Chang et al., 2025; Wu & Long, 2024; Zhou & Duan, 2022). However, existing studies largely focus on isolated green features or strategic-level sustainability disclosure, without examining how UI/UX design elements can be systematically integrated with behavioral models to simultaneously build digital trust, communicate sustainability authenticity, and mitigate greenwashing risk.

### UI/UX Design and User Behavior

UI/UX design encompasses the visual, interactive, and experiential dimensions of digital platforms that shape how users perceive and interact with content. Key UI/UX elements, including informativeness, image quality, and perceived value are central to shaping user experience and driving behavioral outcomes (Back et al., 2020; Lin & Chen, 2023). In the context of green commerce, design elements such as eco-labels, natural color palettes, and certification symbols can enhance perceptions of brand credibility and sustainability (Kaskas & Kitchen, 2024; Zhao et al., 2025). Gamification and personalization further increase perceived value and build emotional attachment to the brand, encouraging green attitudes (Gao et al., 2025; Li et al., 2024). Nevertheless, the literature on UI/UX design in green commerce has not sufficiently addressed the interplay between persuasive design mechanisms, user trust formation,

and the risk of greenwashing perception. This leaves a theoretical gap in understanding how platform design can authentically and credibly communicate environmental values to increasingly skeptical consumers.

**Design Thinking as a Framework**

Design Thinking is a human-centered innovation process comprising five iterative stages: empathize, define, ideate, prototype, and test (Campos Rubio et al., 2024; Zhao et al., 2025). This framework enables designers to deeply understand user needs and iteratively refine solutions based on feedback. In digital platform design, Design Thinking ensures that sustainability principles are not imposed top-down but are co-created with users, resulting in more authentic and effective green interfaces (Al-Olfi et al., 2025; Iqbal et al., 2025).

**The Fogg Behavior Model (FBM)**

The Fogg Behavior Model (FBM) posits that a behavior occurs only when three elements converge simultaneously: motivation, ability, and a prompt (Fogg, 2009). Motivation reflects the user's desire to perform a behavior; ability refers to the simplicity or ease of performing the behavior; and prompts are cues that trigger the behavior at the right moment. The FBM has been applied in digital health, habit formation, and sustainability contexts, demonstrating that well-designed digital prompts can significantly trigger pro-environmental responses (Chang et al., 2025; He et al., 2021). This model provides a robust behavioral foundation for designing green UI/UX elements that nudge users toward sustainable choices. However, prior applications of FBM have focused predominantly on individual-level behavior change in health and habit contexts, with limited attention to how its constructs can be operationalized through UI/UX design in the specific context of green e-commerce and brand credibility building.

**Digital Trust, Persuasive Technology, and Greenwashing Perception**

Digital trust refers to a user's confidence that a digital platform will behave reliably, honestly, and in accordance with its stated values (Bandara et al., 2020; Soleimani, 2022). In the green e-commerce context, digital trust is especially precarious because consumers cannot physically inspect products and must rely on platform-mediated cues to evaluate environmental claims. These cues include eco-labels, certification badges, and sustainability disclosures. Research indicates that design-level signals, including information quality, visual credibility cues, and interface consistency, significantly influence users' perceived trustworthiness of online platforms (Soleimani, 2022). When these signals are absent or inconsistent, consumers are more likely to develop greenwashing suspicions, eroding both trust and purchase intention (Sajid et al., 2024).

Persuasive technology, as theorized by Fogg (2009), refers to interactive computing systems designed to change attitudes or behaviors through persuasion rather than coercion. In the UI/UX domain, persuasive design principles such as commitment devices, social proof indicators, and authority cues, have been shown to effectively guide user decisions toward desired outcomes (Aldenaini et al., 2020; Mosca et al.,

2024). Applied to green e-commerce, persuasive technology offers a structured vocabulary for designing interfaces that encourage pro-environmental choices without being deceptive. Ethical UX design further demands that persuasive mechanisms be transparent and aligned with users' genuine interests, avoiding manipulative dark patterns that could amplify greenwashing risk (Bongard-Blanchy et al., 2021; Caragay et al., 2024). Taken together, digital trust, persuasive technology, and greenwashing perception constitute a critical theoretical cluster that has not been explicitly integrated into prior green e-commerce UI/UX frameworks.

## 3. Research Method

This study employed a qualitative content analysis approach, which is suitable for exploring concepts, identifying patterns, and constructing models in emerging fields such as green e-commerce UI/UX design. This methodological choice enables capturing meanings embedded in qualitative data and synthesizing them into a conceptual framework. The research process consisted of six main stages: (1) data collection, (2) coding frame construction, (3) data coding, (4) data analysis, (5) conceptual model design, and (6) model validation.

Data were gathered through multiple techniques to ensure richness and triangulation: (1) direct observations of three existing green e-commerce platforms operating in Indonesia and internationally, documenting their UI/UX features, green labeling practices, and navigational structures. The three platform were selected purposively based on their active promotion of environmental credentials, variety of organizational scale, and geographic coverage. Platform A (a domestic eco-marketplace actively promoting green product categories), Platform B (a domestic super-app featuring a dedicated green service), and Platform C (an international zero-waste marketplace); (2) semi-structured interviews with three SME owners or managers engaged in green business and six platform users, focusing on their experiences with green e-commerce interfaces, trust perceptions, and decision-making processes. Thematic saturation was reached by the seventh interview, with no new codes emerging from the final two participants, consistent with purposive qualitative sampling guidelines recommending 6–12 informants for saturation in homogeneous populations (Guest et al., 2006). All participants provided written informed consent.

Data collection was conducted in accordance with institutional research ethics guidelines at Politeknik Negeri Bali; (3) systematic online literature searches using keywords related to green e-commerce, UI/UX, Design Thinking, and behavioral nudging; and (4) two focus group discussions (FGDs) involving a total of five experts from the fields of UI/UX design, green business management, and digital marketing. FGD expert composition was comprising two senior UI/UX designers (each with over five years of e-commerce platform experience), one green business practitioner managing an eco-certified SME, and two digital marketing academics, recruited via purposive snowball sampling. All interview and FGD sessions were audio-recorded, transcribed verbatim, and subjected to thematic coding.

The coding frame was constructed by integrating the Design Thinking model proposed by the Institute of Design at Stanford (Campos Rubio et al., 2024) and the Fogg Behavior Model (Fogg, 2009). Design Thinking (Figure 1) was applied as the design-oriented perspective, providing a user-centered structure for examining UI/UX elements across each stage (empathize, define, ideate, prototype, test). FBM (Figure 2) served as the behavioral lens to structure indicators relevant to UI/UX design for green e-commerce, specifically motivation, ability, and prompt.

The five UI/UX principles emerging from the coding process are operationally defined as follows: (1) Eco-friendly design refers to the use of visual elements, such as natural color palettes, green iconography, and eco-certification badges, that visually communicate environmental values, (2) Transparency refers to the clear, accessible, and verifiable presentation of sustainability claims, product origins, and environmental impact data, (3) Gamification refers to the integration of reward mechanisms, progress indicators, and achievement systems that incentivize sustainable purchasing behavior, (4) Personalization refers to the adaptation of platform content and recommendations based on users' environmental preferences and past behavior, and (5) Behavioral nudges refer to subtle design cues, such as default green shipping options, eco-label placement, and contextual prompts, that guide users toward pro-environmental choices without restricting their freedom of choice.

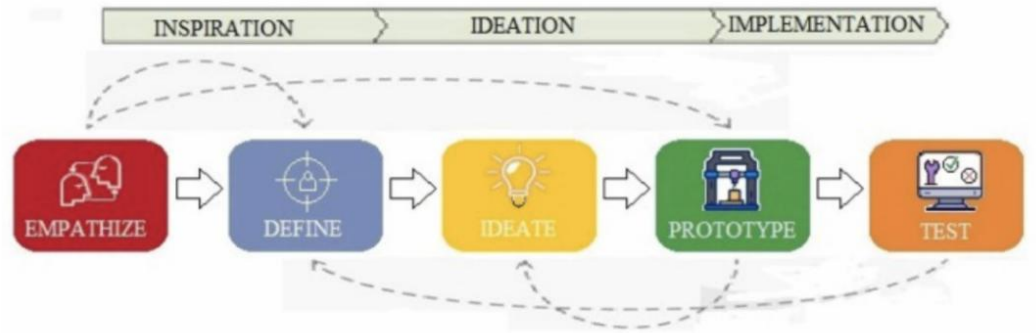



Figure 1. Design thinking model proposed by the Institute of Design at Stanford (Campos Rubio et al., 2024)

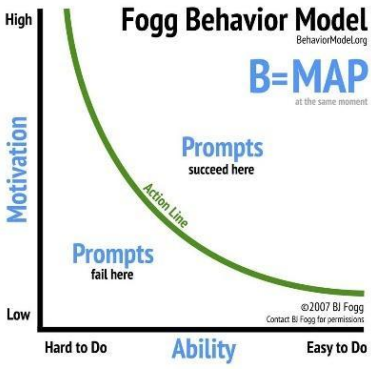



Figure 2. Fogg Behaviour Model (Fogg, 2009)

The collected data were coded deductively and inductively based on the constructed coding frame. This process allowed the identification of recurring themes, behavioral

factors, and design principles relevant to green e-commerce platforms. The results of coding were then analyzed to generate categories and patterns that informed model development. Deductive codes were derived from FBM constructs (motivation, ability, prompt) and Design Thinking stages. Inductive codes emerged organically from the raw data during open coding. Two of the three researchers independently coded 20% of the transcribed data, inter-rater reliability was assessed using Cohen's Kappa ($\kappa = 0.81$) that indicating strong agreement. Discrepancies were resolved through discussion until consensus was reached. The third author, who was not involved in the coding process, participated in the subsequent model validation stage to provide an independent evaluative perspective, thereby reducing potential bias in model construction. No dedicated qualitative analysis software was used. Coding was conducted manually using structured coding sheets aligned with the predefined frame.

The conceptual model was constructed through triangulation of findings from multiple data sources, including observation, in-depth interviews with selected SMEs and users, literature review, and focus group discussions. This triangulation ensured that the model was grounded in diverse perspectives and validated for reliability. The model highlights how design thinking processes and behavioral triggers (motivation, ability, prompt) can be operationalized in e-commerce platforms to reduce the risk of greenwashing.

The proposed conceptual model was validated through expert FGDs involving practitioners and academics in the fields of UI/UX, green business, and digital marketing. Expert feedback was used to refine the model, ensuring both theoretical soundness and practical relevance.

## 4. Results and Discussion

### *4.1. Results*

The triangulation process across all data sources revealed three consistent patterns that informed model development. First, observations of the three green e-commerce platforms showed that most lacked standardized UI/UX elements to communicate sustainability authentically namely eco-labels were inconsistently placed, sustainability disclosures were buried in secondary pages, and visual design rarely employed consistent green branding cues. For example, on Platform A, eco-labels appeared on only approximately one-third of listed products and were entirely absent from the checkout flow. Platform B featured a dedicated green service section but did not consistently apply sustainability iconography across its product listing pages. Platform C embedded carbon-offset information throughout the user journey but used dense textual disclosures that users found difficult to process quickly.

Second, interview findings revealed that SME users and consumers identified transparency and visual eco-cues as the most trusted design signals. Users frequently reported difficulty distinguishing genuine green features from marketing claims, highlighting the urgent need for design-level authenticity mechanisms. Representative verbatim examples include: an SME owner stated, “Customers keep asking us if our

eco-label is real, they cannot tell from the website alone," while a user participant noted, "I always look for a certification page but it is usually buried three or four clicks deep." A third user added, "When I see a green badge I want to know who gave it, because right now I just have to trust it."

Third, expert FGD participants reached consensus on the relevance of behavioral nudge architecture as a practical tool for guiding eco-conscious decisions, and validated that the integration of Design Thinking with FBM provided a sufficiently holistic framework to guide platform development. One FGD expert summarized: "The problem isn't user awareness of sustainability, but rather design barriers. There's currently no standard for where eco-friendly information should appear in the user journey, so each platform creates its own approach, and users can't build consistent expectations."

These converging findings informed the development of the three-layered conceptual model presented in Figure 3. The model is structured to connect the design process (left layer), UI/UX sustainability principles (middle layer), and user behavior foundations (right layer).

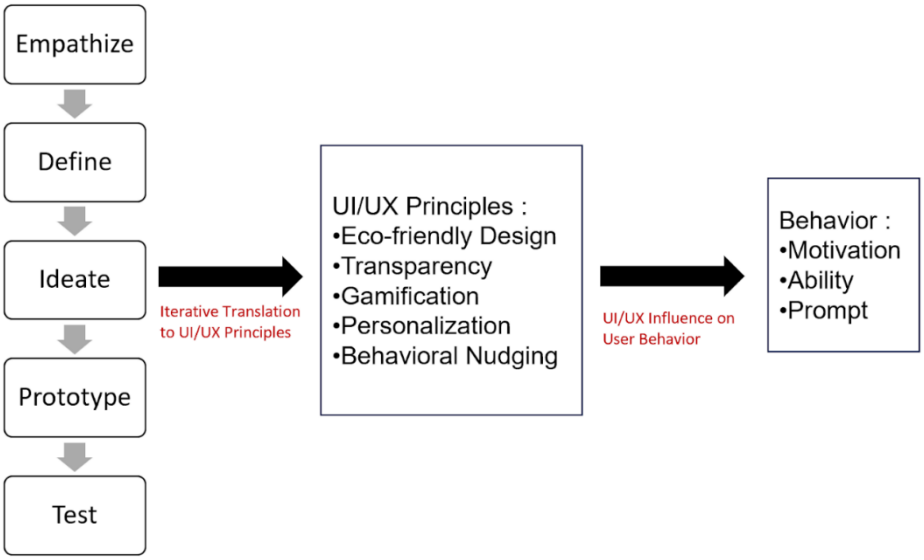



Figure 3. The Conceptual Model of Green E-Commerce UI/UX Design toward Enhancing Brand Image

### *4.2. Discussion*

**Left Layer: Design Thinking Process**

The left layer adopts the five stages of Design Thinking, empathize, define, ideate, prototype, and test as a user-centered approach contextualized to green business (Campos Rubio et al., 2024; Zhao et al., 2025). The iterative translation process, indicated by the connecting arrow in Figure 1, ensures that design ideas are continuously refined through user validation so that user needs and sustainability values are aligned. The stages in the left layer are not a one-time cycle but a repetitive process that combines idea exploration and user validation to produce effective UI/UX elements, which are then translated into concrete UI/UX principles in the middle layer.

**Middle Layer: UI/UX Sustainability Principles**

The middle layer summarizes the five main principles of UI/UX design in green e-commerce: eco-friendly design, transparency, gamification, personalization, and behavioral nudging. UI/UX principles are essential tools for effectively conveying green knowledge and values (Al-Olfi et al., 2025; Iqbal et al., 2025; Zhao et al., 2025). Observation data revealed that most green e-commerce platforms struggle to communicate sustainability information clearly, a finding corroborated by interview results where users expressed difficulty in distinguishing genuine green features from marketing claims.

Transparency is closely related to informativeness, which refers to how clearly and easily sustainable information is presented. Research confirms that an informative and honest UI drives green trust and eco-friendly purchases (Chang et al., 2025; Veličković et al., 2025; Wu & Long, 2024; Zhou & Duan, 2022). Eco-friendly design emphasizes green as a key visual factor: product visualizations showing eco-friendly packaging, certification symbols, and natural appearances can enhance perceptions of brand credibility (Lin & Chen, 2023; Zhao et al., 2025). Gamification and personalization not only increase perceived value (Back et al., 2020; Li et al., 2024) but also build emotional attachment to the brand. Reward systems such as 'green user' badges can increase user motivation to choose sustainable products (Gao et al., 2025).

**Right Layer: Behavioral Foundation (FBM)**

The right layer provides a psychological foundation using the Fogg Behavior Model (FBM) to explain the conditions under which sustainable behavior occurs through the interaction of motivation, ability, and prompts (Fogg, 2009). Behavioral nudging functions as a subtle influence mechanism that guides user decisions. Chang et al. (2025) demonstrate that eco-labels (stimulus) trigger cognitive processes (organism) resulting in environmental awareness (response), strengthening the relationship between green knowledge, green features, and persuasive UX design (Chang et al., 2025).

Principles such as gamification, visual eco-branding, and personalized green messages are closely related to increased motivation. Li et al. (2024) and Wernbacher et al. (2023) show that providing incentives or symbolic recognition (such as a “green shopper” badge) encourages users to be more active in choosing environmentally friendly products (Li et al., 2024; Wernbacher et al., 2023). Prompts are presented through behavioral nudges such as default options for green shipping, prominent button designs for sustainable products, or contextual calls-to-action. Chang et al. (2025) and Kaskas and Kitchen (2024) confirm that prompts embedded in design architecture can significantly trigger pro-environmental responses (Chang et al., 2025; Kaskas & Kitchen, 2024).

**Implications of the Conceptual Model**

To operationalize the relationship between each UI/UX principle and the FBM constructs more explicitly, Table 1 presents a mapping of how each principle activates specific behavioral components and contributes to green brand image outcomes.

Table 1. Mapping of UI/UX Principles to FBM Components and Green Brand Image Outcomes

| UI/UX Principle | FBM Component Activated | Design Mechanism | Green Brand Image Outcome |
|---|---|---|---|
| Eco-friendly Design | Motivation | Green color palettes, eco-badges, nature-inspired iconography signal environmental identity | Heightens perceived environmental credibility; reduces greenwashing skepticism via consistent visual cues |
| Transparency | Motivation + Ability | Prominent placement of certifications, supply chain data, and carbon impact disclosures | Builds digital trust; directly counters greenwashing perception by enabling informed verification |
| Gamification | Motivation + Prompt | Points, badges, progress bars, and leaderboards tied to green purchases | Increases emotional brand attachment and repeat eco-purchase behavior; reinforces green identity |
| Personalization | Motivation + Ability | Eco-preference-based product recommendations; tailored sustainability messaging | Reduces cognitive effort in green decision-making; strengthens perceived brand relevance and care |
| Behavioral Nudges | Prompt + Ability | Default green shipping, contextual eco-prompts, real-time carbon offset display at checkout | Triggers pro-environmental decisions at critical moments; signals brand commitment to sustainability |

This framework demonstrates that the success of green e-commerce is not only determined by the presence of eco-friendly features or visual aesthetics, but by how effectively UI/UX design activates motivation, ability, and prompts in users. By integrating Design Thinking, green UI/UX principles, and FBM, the model provides a holistic approach to creating digital platforms that support a credible green brand image and minimize the risk of greenwashing practices.

From a theoretical standpoint, this model extends the application of FBM beyond individual behavior change to the domain of sustainable e-commerce platform design, and demonstrates how Design Thinking can serve as an operationalization process for behavioral theory. From a practical standpoint, the model offers SMEs concrete guidance across five actionable design dimensions: (1) adopting green color palettes and eco-badge systems as eco-friendly visual cues; (2) placing sustainability data and certifications in prominent, easily navigable locations to ensure transparency; (3) implementing points-based reward systems tied to sustainable purchases to activate gamification; (4) configuring product recommendation algorithms to surface eco-friendly alternatives based on user history as a personalization strategy; and (5) setting green shipping as the default checkout option and displaying real-time carbon offset information as behavioral nudges. These are low-to-medium investment design decisions that SMEs can implement incrementally using open-source or low-cost e-

commerce platforms, making the framework accessible without requiring enterprise-level budgets.

## 5. Conclusion

This study developed a conceptual model for green e-commerce UI/UX design aimed at enhancing the brand image of eco-friendly businesses using a qualitative content analysis approach. The model is built on three interrelated layers: (1) the Design Thinking process, which places the user at the center of interface design through its iterative stages of empathize, define, ideate, prototype, and test; (2) five green UI/UX principles, such as transparency, eco-friendly design, gamification, personalization, and behavioral nudges, that emphasize sustainability elements; and (3) the Fogg Behavior Model (FBM), which provides a psychological foundation explaining how design can trigger eco-friendly behavior through motivation, ability, and prompts.

The integration of design, technology, and user behavior in this model creates a comprehensive conceptual framework for designing e-commerce platforms that are not only environmentally friendly but also positively impact brand image. This model is specifically designed to support SMEs running eco-friendly businesses by reducing greenwashing risks and increasing brand credibility among environmentally conscious consumers. Future research should empirically test this framework through usability experiments and behavioral data analysis to measure its impact on sustainable purchasing decisions. Some limitations of this study include: (1) the sample is relatively small, so the resulting model should be treated as an initial conceptual framework that needs to be validated through larger and more diverse samples in future studies; (2) there has been no empirical testing of the proposed model, so it must be validated rigorously through experimental, survey-based, or longitudinal methods before practical recommendations are adopted on a large scale.

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