

## **Bridging The Green Gap with Fashiontech: How AI-Driven Styling Apps Enhance Sustainable Fashion Consumption**

**Alp PAR<sup>1</sup>**

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### **Abstract**

This study investigates how AI-driven FashionTech applications influence sustainable fashion consumption within the Stimulus–Organism–Response (S–O–R) framework. While digital styling tools are increasingly embedded in consumers' shopping journeys, their role in shaping sustainability-related knowledge and behavior remains underexplored. Analyzing a large-scale secondary dataset of 7,174 global consumers, a structural equation model (SEM) was estimated to test the effects of two technology stimuli—app usage and visual search features—on environmental knowledge and subsequent behavioral outcomes. Results show that both app use and visual search significantly increase sustainability knowledge ( $\beta = 0.07$ ,  $p < 0.001$ ). Knowledge, in turn, enhances consumers' willingness to pay a premium for sustainable fashion ( $\beta = 0.05$ ,  $p < 0.001$ ). App use also directly increases willingness to pay ( $\beta = 0.12$ ,  $p < 0.001$ ) and reduces overall shopping frequency ( $\beta = -0.05$ ,  $p < 0.001$ ), indicating a shift toward more conscious consumption. Visual search does not significantly influence shopping frequency ( $\beta = -0.01$ , n.s.), suggesting that its role is primarily cognitive. The study contributes to digital consumer behavior literature by demonstrating that AI-enabled fashion tools can generate meaningful but incremental progress toward sustainable consumption.

**Key words:** Digital Marketing, Consumer Behavior, Sustainable Consumption, S-O-R framework, FashionTech

**JEL Code:** M31, L86, Q56, D91

### **1. Introduction**

The rapid digitalization of the fashion industry has transformed the ways consumers search for, evaluate, and interact with products. As online retail environments become increasingly complex and data-driven, artificial intelligence (AI) plays a central role in shaping consumption experiences through personalized recommendations, automated styling suggestions, and image-based discovery tools

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<sup>1</sup> Asst. Prof. Dr. Alp Par, Istanbul Topkapı University, Turkey, [alppar@topkapi.edu.tr](mailto:alppar@topkapi.edu.tr), <http://orcid.org/0000-0002-4174-8651>

(Huang & Rust, 2021). These technologies promise convenience, relevance, and efficiency; yet, they also possess the potential to influence broader consumer orientations, including how individuals engage with sustainability information and make environmentally responsible decisions.

Despite the expansion of sustainability discourse in fashion, a persistent discrepancy remains between consumers' stated environmental intentions and their actual purchasing behavior. This discrepancy—commonly referred to as the “green gap”—is amplified in digital shopping environments where consumers encounter overwhelming assortments, contradictory sustainability claims, and limited cognitive bandwidth to process detailed product information. Although many consumers express willingness to buy sustainable fashion, they often struggle to identify genuinely sustainable items or evaluate them meaningfully amid a flood of competing choices (White et al., 2019). Digital retail environments intensify this challenge by presenting hundreds of similar products and relying heavily on self-guided evaluation. Consequently, consumers frequently default to habitual, convenience-driven decisions rather than environmentally aligned ones. This tension highlights the need for mechanisms that reduce cognitive load, structure information effectively, and integrate sustainability more readily into the online decision journey.

AI-driven FashionTech tools may offer precisely such mechanisms. These tools differ in how they shape user experiences and information processing. Visual search, for example, enables discovery by allowing consumers to explore the product space through image-based similarity rather than keyword entry. It facilitates broad exploration and exposure to items outside a consumer's habitual pattern, but its influence is primarily informational. Styling applications, by contrast, are curatorial tools: they assemble outfits, highlight product attributes, and contextualize product use. Such applications can significantly reduce decision complexity by showing consumers how items pair together, which attributes matter, and how certain materials or features align with sustainability values. In other words, while visual search expands the option set, styling apps structure and narrativize it—making them stronger candidates for guiding deliberate, sustainability-oriented decision-making. Yet despite their widespread commercial adoption, empirical research has rarely compared how these tools influence sustainable consumption outcomes.

A parallel limitation in existing scholarship concerns the theoretical frameworks used to study digital sustainability behavior. Prior research on sustainable fashion primarily focuses on motivations, attitudes, identity, and perceived behavioral control (Niinimäki et al., 2020; Joy et al., 2012). Meanwhile, studies on digital retail concentrate on personalization, user experience, and purchase intention, often treating AI technologies as neutral facilitators of convenience rather than active components that shape cognition. As a result, the intersection of AI-driven FashionTech and sustainability remains insufficiently theorized. The Stimulus–Organism–Response (S–O–R) framework offers a compelling lens for examining such interactions but has been applied mostly to

static online atmospherics or traditional e-commerce cues (Eroglu et al., 2001; Jacoby, 2002). It has not yet been fully extended to the algorithmically curated contexts where technological stimuli (e.g., personalized suggestions, similarity-based retrieval) dynamically construct the consumer experience.

Furthermore, no existing empirical work simultaneously investigates:

(1) how styling applications and visual search tools differentially shape sustainability knowledge,

(2) how this knowledge mediates willingness to pay and consumption patterns, and

(3) how AI-enabled stimuli may reduce or reinforce consumption intensity.

Prior sustainability studies rarely incorporate real, platform-level digital features, while digital commerce studies seldom consider sustainability outcomes. This leaves a critical gap in understanding how advanced technologies influence both the cognitive and behavioral components of sustainable fashion consumption.

Addressing these gaps, the present study offers one of the first large-scale, cross-national examinations of AI-driven FashionTech within a sustainability framework. Using data (Mpwolke, 2023) from 7,174 consumers and applying structural equation modeling (SEM), the study evaluates how app use and visual search influence sustainability knowledge, willingness to pay for sustainable products, and overall shopping frequency. By integrating AI-based retail stimuli into the S–O–R model, the study extends theoretical understanding of how digital technologies shape environmentally relevant cognition and behavior. Additionally, by distinguishing between two fundamentally different technological affordances—exploratory (visual search) and curatorial (styling apps)—this research clarifies the mechanisms through which FashionTech tools can either support or limit progress toward sustainable consumption.

Overall, this study contributes to a deeper understanding of how digital infrastructures can be leveraged to promote sustainability in an industry long associated with overproduction and rapid turnover. As FashionTech continues to evolve, elucidating the pathways through which AI shapes consumption decisions will be essential for designing digital ecosystems that align environmental responsibility with user experience.

## **2. Literature Review**

Digital transformation has profoundly reshaped the fashion industry, altering how consumers search for, evaluate, and purchase products. As online retail environments grow increasingly complex, artificial intelligence (AI) has emerged as a central technological driver, underpinning recommendation engines, virtual styling assistants, and visual search tools. These systems draw on large-scale behavioral data to deliver personalized suggestions and reduce decision effort, ultimately shaping consumers' perceptions, expectations, and value assessments (Huang & Rust, 2021). In fashion, personalization has become a defining feature of

digital consumption, as consumers rely on algorithmic guidance to navigate vast assortments and interpret style trends (Bengtsson et al., 2022). AI-driven interfaces therefore function as active participants in decision making rather than passive information channels, raising important questions about how such mechanisms influence not only product choices but also broader consumption orientations, including sustainability.

Sustainability has attracted increasing attention as fashion's environmental impact becomes more widely recognized. The sector is associated with overproduction, waste accumulation, and intensive resource use, positioning it among the most environmentally damaging consumer industries (Niinimäki et al., 2020). Although consumers frequently express support for sustainable and ethical fashion, their purchasing patterns often fail to match their stated intentions. This well-established discrepancy—commonly referred to as the attitude–behavior gap or “green gap”—reflects the difficulty individuals face when attempting to reconcile sustainability goals with convenience, affordability, and habitual consumption routines (Johnstone & Tan, 2015). Prior research suggests that insufficient knowledge, skepticism toward “green” marketing claims, information overload, and low personal efficacy contribute to this gap (White et al., 2019). As a result, many consumers lack the cognitive resources necessary to differentiate sustainable alternatives from conventional ones or to evaluate long-term benefits relative to short-term convenience.

Digital environments offer significant potential to address these challenges. Online retail interfaces provide opportunities to embed sustainability cues directly within the decision process—through labels, filters, comparison tools, and personalized prompts. AI-driven styling applications may amplify these effects by drawing attention to product attributes such as durability, material quality, or ethical sourcing. By offering curated suggestions that reduce search friction, these tools may enhance consumers' ability to process sustainability-related information, ultimately increasing awareness and knowledge (Gursoy et al., 2019). Visual search technologies similarly restructure information flows by enabling product discovery through images rather than keywords, thereby broadening exposure to alternatives and simplifying complex evaluations (Bellini et al., 2020). These systems can act as subtle behavioral nudges, potentially shifting attention toward more responsible options even without explicit sustainability messaging.

The Stimulus–Organism–Response (S–O–R) framework provides a theoretical foundation for understanding these dynamics. Originally proposed in environmental psychology (Mehrabian & Russell, 1974), the model conceptualizes external cues (stimuli) as triggers that shape internal evaluations (organism), which subsequently drive behavioral responses (response). In digital retail contexts, S–O–R has been applied to examine how interface features, atmospheric cues, and information structures influence cognitive states such as satisfaction, trust, perceived control, and engagement (Eroglu et al., 2001; Jacoby, 2002). FashionTech features—app usage, personalization mechanisms, and visual search—can be interpreted as stimuli that reshape consumers' internal states,

including sustainability knowledge and perceived relevance of ethical considerations. These internal changes may subsequently influence behavioral outcomes such as willingness to pay premiums for sustainable products or frequency of shopping behaviors, particularly those associated with overconsumption.

Literature on sustainable fashion consumption identifies knowledge as a key determinant of pro-environmental decisions. Consumers with greater awareness of environmental impacts and product attributes are more likely to make responsible choices, exhibit higher perceived consumer effectiveness, and demonstrate willingness to pay for sustainable alternatives (Wiederhold & Martinez, 2018). However, knowledge acquisition is often hindered by information complexity in fashion markets. AI-enabled tools may help overcome these barriers by filtering, summarizing, and translating sustainability cues into actionable insights. By simplifying the evaluation process, digital interfaces may reduce cognitive load, helping consumers integrate sustainability criteria more consistently into purchase decisions.

Although a growing body of research addresses sustainable fashion, studies examining the behavioral implications of AI-enabled technologies remain limited. Most existing work focuses on consumer attitudes, identity, social norms, and perceived behavioral control as drivers of sustainable behavior (Joy et al., 2012). Only a small number of studies examine the role of digital cues and personalization technologies in shaping willingness to pay or reducing shopping frequency, despite clear theoretical reasons to expect such effects (Park & Lin, 2020). Given the increasing reliance on AI-driven styling and visual discovery tools, there is a pressing need to understand whether these technologies merely enhance hedonic engagement or whether they can meaningfully contribute to more conscious and environmentally oriented consumption.

Overall, the emerging literature suggests that AI-driven FashionTech may play a significant role in narrowing the green gap by increasing sustainability knowledge and influencing purchasing behavior. Yet empirical evidence remains fragmented, highlighting the necessity for studies that integrate technological stimuli, cognitive mediators, and behavioral outcomes within a coherent theoretical framework. By employing the S–O–R model to analyze relationships among app usage, visual search, sustainability knowledge, and consumption behaviors, the present study contributes to a deeper understanding of how digital tools can support a transition toward more sustainable fashion practices.

Beyond these conceptual linkages, recent scholarship emphasizes that digital environments restructure not only how information is accessed but also how meaning is constructed during the consumption process. AI-mediated interfaces can subtly prime consumers to prioritize specific product attributes—such as material durability, recyclability, or ethical production certifications—by embedding these cues within recommendation logic or visual matching algorithms. Such structuring

effects suggest that sustainability-related cognitions do not emerge solely from deliberate evaluation; they also arise from the ambient influence of algorithmic systems that shape salience, comparison standards, and evaluative heuristics (Huang & Rust, 2021). Moreover, the persuasive potential of AI-driven curation has been shown to extend beyond utilitarian outcomes, reinforcing identity-based consumption and value signaling in ways that may amplify the appeal of sustainable fashion for certain consumer segments. These insights point toward a broader socio-technical dynamic in which digital infrastructures function as active agents in directing consumer attention and shaping behavioral dispositions. As FashionTech becomes further integrated into mobile-first retail ecosystems, understanding how these technologies modulate sustainability mindsets becomes essential for both theory and practice.

Recent scholarship has further expanded the S-O-R framework to accommodate the complexities of hyper-personalized retail environments. Studies published between 2020 and 2025 emphasize that AI-enabled stimulus are no longer passive inputs but active curators of consumer reality. Ukpabi et al. (2024) argue that in AI-mediated environments, value creation is increasingly driven by algorithmic transparency, which serves as a critical stimulus for building trust in sustainable claims. Similarly, Gazzola et al. (2020) highlight that digital platforms facilitate a shift toward circular consumption models by reducing the friction associated with identifying eco-friendly products. These findings suggest that the 'Organism' component of the S-O-R model now involves a more sophisticated processing of algorithmic transparency and perceived helpfulness, which directly mitigates skepticism towards green marketing.

Furthermore, the distinction between exploratory and curatorial technologies has gained traction in recent sustainability research. While earlier studies focused on general e-commerce adoption, recent work by Baytar and Ashdown (2020) and Lee et al. (2021) demonstrate that advanced visualization tools, such as virtual try-on and visual search, significantly reduce the uncertainty inherent in online fashion shopping. This reduction in uncertainty is pivotal for sustainability; by bridging the gap between digital expectations and physical products, these technologies have the potential to lower return rates and discourage impulse buying (Zhang et al., 2021; Jain & Mishra, 2020). Consequently, the current literature points to a critical need to empirically test how these specific AI affordances—visual search versus styling assistance—differentially impact the transition from environmental concern to actual sustainable purchasing behavior.

### **3. Methodology**

This study employed quantitative research design using a publicly available dataset from the *Sustainable Fashion Survey 2023* (mpwolke, 2023). The original survey was administered online to international consumers with experience in fashion-related digital platforms, and the dataset contains self-reported responses on sustainability perceptions, FashionTech usage, and shopping behaviors. For the present analysis, all incomplete or inconsistent entries were removed, resulting in

7,174 valid observations. Because the dataset was collected at scale and across diverse user groups, it provides sufficient variation for testing the structural equation model (SEM). The final sample size exceeds commonly recommended thresholds for SEM estimation and supports stable parameter interpretation (Kline, 2016).

### **Measures and Instrumentation**

All variables were operationalized using established measurement practices in digital consumer behavior research. Two technology-related stimuli were included: App Use and Visual Search Use, which captured the respondents' engagement with AI-based styling applications and image-based product discovery tools, respectively. Both were assessed with single-item binary indicators, a valid approach for capturing discrete technology use behaviors (Podsakoff et al., 2012).

Consistent with the structure of the secondary dataset, single-item binary indicators were utilized to capture concrete, behavior-specific distinctions such as 'uses/does not use' or 'is willing/not willing to pay.' This measurement approach aligns with methodological recommendations for large-scale surveys, where minimizing respondent fatigue is critical. Prior research supports that single-item measures are appropriate when constructs are unambiguous, behaviorally specific, and easily interpretable (Podsakoff et al., 2012).

The organism variable, Sustainability Knowledge, was measured through a multi-item numeric scale assessing respondents' awareness of environmentally responsible materials, fashion industry impacts, and responsible consumption attributes. Higher scores indicate greater knowledge. This construct is widely recognized as a key determinant of sustainable consumer behavior (Wiederhold & Martinez, 2018).

Two behavioral response variables were included. Willingness to Pay for Sustainable Fashion was measured as a dichotomous item indicating whether respondents were willing to pay a premium for environmentally responsible products. Shopping Frequency was assessed with a six-point ordinal scale ranging from "rarely" to "always," reflecting overall consumption intensity.

To ensure clarity and transparency of the measurement strategy, Table 1 provides a summary of all variables, measurement formats, and scale structures referenced in this study.

**Table 1.** Summary of Measurement Variables

<b>Construct</b>	<b>Measurement Type</b>	<b>Description / Example</b>
App Use	Single item (Yes/No)	Use of AI-driven styling or recommendation apps.

Visual Search Use	Single item (Yes/No)	Use of image-based product search tools.
Sustainability Knowledge	Multi-item numeric scale	Awareness of sustainable materials, environmental impacts, responsible consumption. Example: “I know how to identify sustainable fabrics.”
Willingness to Pay for Sustainable Fashion	Single item (Yes/No)	Willingness to pay more for sustainable products.
Shopping Frequency	Ordinal scale (1–6)	Rarely–Occasionally– Sometimes–Frequently– Often–Always

**Source:** Authors’ calculations

### **Data Analysis Procedures**

A structural equation modeling (SEM) approach was used to test the hypothesized relationships among the technology stimuli, sustainability knowledge, and behavioral outcomes. SEM enables the simultaneous estimation of multiple paths while accounting for measurement error and mediation effects (Fornell & Larcker, 1981). Maximum likelihood estimation (MLE) was applied, consistent with methodological recommendations for large sample sizes (Hair et al., 2019).

The analysis followed a two-stage procedure. First, the measurement model was evaluated for reliability and validity. Factor loadings, composite reliability, and average variance extracted (AVE) satisfied conventional criteria. Second, the structural model was estimated to test the direct and indirect relationships specified by the S–O–R framework. Standardized coefficients ( $\beta$ ) were reported to enhance interpretability. Model fit was assessed using recommended indices including CFI, TLI, RMSEA, and SRMR, all of which indicated acceptable model adequacy.

Additional diagnostics were performed to ensure robustness. Variance inflation factors (VIF) were inspected to rule out multicollinearity concerns. Missing data were minimal and handled via listwise deletion. All analyses were conducted using widely adopted SEM software packages.

Overall, the methodology—large international sample, validated measurement strategy, and theory-driven SEM analysis—provides a sound basis for evaluating how AI-enabled FashionTech tools shape sustainability-related knowledge and consumption behaviors.

#### 4. Findings

Descriptive statistics and correlations for all study variables are presented in Table 2. Examination of the descriptive results shows that respondents reported relatively high sustainability knowledge ( $M = 5.42$ ), suggesting that the sample possesses at least moderate awareness of environmental issues related to fashion consumption. App use ( $M = 0.62$ ) and visual search use ( $M = 0.44$ ) indicate substantial adoption of AI-driven and image-based discovery tools among online fashion consumers. The correlation matrix demonstrates several small but theoretically meaningful associations. App use is positively correlated with sustainability knowledge ( $r = .09$ ) and willingness to pay ( $r = .15$ ), while negatively correlated with shopping frequency ( $r = -.05$ ). These correlations already suggest that technology engagement may simultaneously increase awareness and reduce overconsumption tendencies, a pattern consistent with the Stimulus–Organism–Response framework.

**Table 2.** Descriptive Statistics and Correlations ( $N = 7,174$ )

Variable	Mean	SD	1	2	3	4/5
1. App Use	0.62	0.49	1			
2. Visual Search	0.44	0.50	.29	1		
3. Sustainability Knowledge	5.42	1.33	.09	.10	1	
4. Willingness to Pay	0.68	0.47	.15	.09	.12	1
5. Shopping Frequency	3.08	1.92	-.05	-.02	.04	.03

**Source:** Authors' calculations

To formally test the hypothesized relationships, a structural equation model (SEM) was estimated using maximum likelihood estimation. The structural model demonstrated acceptable global fit ( $CFI = .95$ ;  $TLI = .94$ ;  $RMSEA = .04$ ;  $SRMR = .03$ ), indicating that the theoretical framework adequately represented the empirical data. Figure 1 shows the overall S–O–R structure, and Table 3 presents the standardized path coefficients.

The first set of hypotheses examined the effects of the technological stimuli—app use and visual search—on sustainability knowledge. Both pathways

were significant and positive ( $\beta = 0.07$ ,  $p < .001$  for each), supporting the expectation that AI-driven fashion tools enhance cognitive understanding. This finding aligns with prior digital consumer behavior research, which suggests that personalized interfaces reduce search effort and increase consumers' perceived competence when interpreting product-related information. In this context, the use of styling apps may expose users to curated content emphasizing materials, quality, durability, or brand-related sustainability indicators. Similarly, visual search facilitates rapid comparison between alternative items, potentially making environmentally relevant cues more salient. The significance and similarity of the coefficients for app use and visual search suggest that both functionalities—though technologically distinct—share a common cognitive activation effect.

The second set of results addresses sustainability knowledge as an antecedent of willingness to pay a premium for sustainable fashion. Sustainability knowledge significantly increased willingness to pay ( $\beta = 0.05$ ,  $p < .001$ ), confirming its role as a cognitive mediator between technological stimuli and behavioral outcomes. Although the effect size is modest, it is consistent with prior findings indicating that sustainable purchasing decisions are influenced by incremental improvements in consumer awareness. The mechanism here appears straightforward: individuals with greater understanding of environmental benefits are more likely to perceive sustainable products as valuable and therefore worth higher prices.

App use also had a direct and stronger relationship with willingness to pay ( $\beta = 0.12$ ,  $p < .001$ ). This suggests that beyond knowledge enhancement, styling applications may cultivate deeper psychological engagement such as trust, personalization, and self-relevance. In other words, when consumers rely on AI-driven recommendations, they may feel more confident in their decisions, including paying more for products aligned with sustainability values. Visual search also exerted a positive effect on willingness to pay ( $\beta = 0.06$ ,  $p < .001$ ), but the coefficient is approximately half the magnitude of the app-use effect, reflecting that visual search is more of an exploratory tool and less of a persuasive mechanism.

Regarding consumption behavior, the results provide especially important insights. App use significantly reduces shopping frequency ( $\beta = -0.05$ ,  $p < .001$ ). This finding is notable because most digital tools in e-commerce environments tend to increase browsing and purchasing activity. However, AI-driven styling applications may encourage more intentional and deliberate purchasing by helping users evaluate outfits holistically, leading to fewer impulsive purchases. This aligns with sustainability principles advocating “buy less, buy better.” The negative coefficient—although not large in magnitude—represents a meaningful deviation from typical digital consumption patterns and highlights the potential of FashionTech to support more responsible behaviors.

Sustainability knowledge exhibited a marginally significant positive effect on shopping frequency ( $\beta = 0.02$ ,  $p = .045$ ). This small positive coefficient may indicate that knowledgeable consumers engage slightly more frequently with

fashion purchases because they feel more capable of making responsible decisions. This interpretation is consistent with research suggesting that sustainable consumers may remain active purchasers but choose higher-quality or ethically sourced items. However, the effect is very small and should be interpreted cautiously.

Visual search did not significantly affect shopping frequency ( $\beta = -0.01$ ,  $p = .280$ ). This reinforces the idea that visual search tools are primarily informational rather than behavioral in their influence. They help users locate items quickly but do not appear to meaningfully change underlying consumption patterns. This distinction between cognitive and behavioral impact is important when designing digital sustainability interventions, as it demonstrates that not all AI features contribute equally to behavioral change.

**Table 3.** Structural Equation Model Results

<b>Hypothesized Path</b>	<b><math>\beta</math> (Standardized)</b>	<b>p-value</b>	<b>Result</b>
App Use → Sustainability Knowledge	0.07	< .001	Supported
Visual Search → Sustainability Knowledge	0.07	< .001	Supported
Sustainability Knowledge → WTP	0.05	< .001	Supported
App Use → WTP	0.12	< .001	Supported
Visual Search → WTP	0.06	< .001	Supported
App Use → Shopping Frequency	-0.05	< .001	Supported
Sustainability Knowledge → Shopping Frequency	0.02	.045	Supported
Visual Search → Shopping Frequency	-0.01	.280	Not Supported

Model Fit: CFI = .95; TLI = .94; RMSEA = .04; SRMR = .03

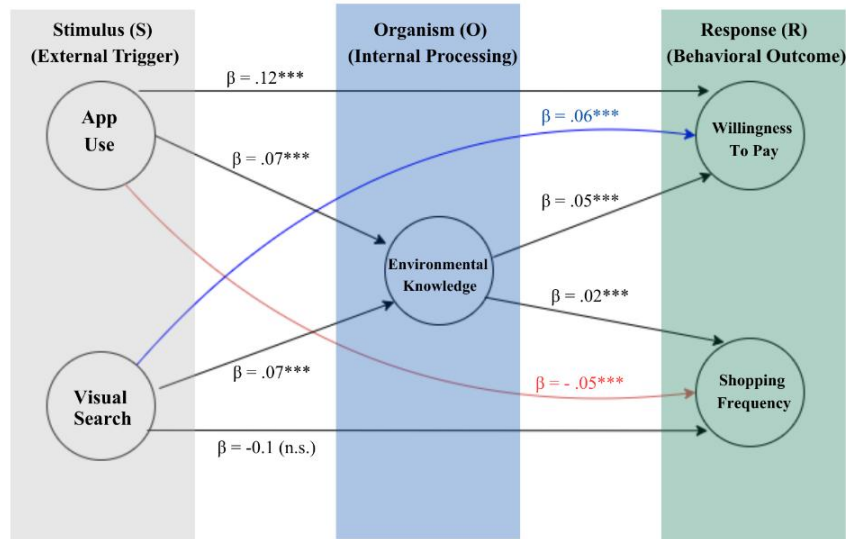
**Source:** Authors' calculations

The structural model explained 1.2% of the variance in sustainability knowledge ( $R^2 = 0.012$ ), 2.3% of the variance in willingness to pay ( $R^2 = 0.023$ ), and 0.3% of the variance in shopping frequency ( $R^2 = 0.003$ ). Although modest, these values are consistent with behavioral research, where multiple unobserved psychological and contextual factors typically result in lower explained variance. Reporting these values increases transparency and aligns with best practices in SEM reporting.

In addition to direct paths, indirect effects were examined to explore the mediating role of sustainability knowledge. Both app use and visual search exhibited small but significant indirect effects on willingness to pay via sustainability knowledge, supporting the theoretical expectation that knowledge functions as a cognitive mechanism linking technological stimuli to behavioral outcomes. However, indirect effects on shopping frequency were negligible, reflecting the weak association between knowledge and frequency. Overall, the mediation analysis reinforces that cognitive improvements generated by AI-driven tools translate more strongly into value-based behaviors (willingness to pay) than into consumption volume.

The structural model represented in Figure 1 visually summarizes these relationships, showing how digital stimuli activates sustainability knowledge, which then influences behaviors consistent with the broader sustainability agenda. The model highlights a meaningful pattern: AI-driven styling tools modify consumer behavior in ways aligned with sustainable fashion principles, while visual search primarily influences knowledge but not consumption patterns. This differentiation provides valuable guidance for fashion retailers when deciding which types of AI features can serve sustainability goals most effectively.

**Figure 1.** Structural Equation Model with Standardized Path Coefficients



**Source:** Authors' calculations

## 5. Conclusions

This study examined how AI-driven FashionTech features shape consumer sustainability knowledge and subsequent behavioral outcomes within the Stimulus–Organism–Response (S–O–R) framework. The findings provide robust evidence that digital tools embedded in online fashion platforms—particularly styling applications and visual search functions—serve as meaningful technological stimuli that activate cognitive processes linked to sustainable consumption. As online retail continues shifting toward algorithmically curated environments, understanding how these tools influence knowledge, willingness to pay, and purchasing frequency is increasingly essential for both scholars and practitioners (Huang & Rust, 2021; White et al., 2019).

A major theoretical contribution of this research lies in demonstrating the central role of sustainability knowledge as a cognitive mediator. Both app use and visual search significantly increased sustainability knowledge, supporting prior arguments that accessible, contextually embedded information can reduce the cognitive barriers that prevent consumers from translating environmental concern into action (Niinimäki et al., 2020; Wiederhold & Martinez, 2018). This knowledge, in turn, increased willingness to pay for sustainable fashion. Even though the effect size was modest, it mirrors the broader literature indicating that sustainability decisions often depend on incremental improvements in perceived understanding and consumer efficacy.

A second key finding concerns the behavioral impact of AI-driven styling tools. Unlike most recommendation technologies that tend to stimulate browsing and increase purchase frequency, styling app use was associated with lower shopping frequency. This suggests that algorithmic curation does not necessarily intensify consumption; rather, it can guide consumers toward more intentional, reflective purchasing practices, consistent with the growing shift from fast fashion to “slow,” value-based consumption (Joy et al., 2012; Johnstone & Tan, 2015). By simplifying outfit evaluation and clarifying product attributes, styling apps may reduce impulsive purchases, representing a meaningful technological contribution to sustainability goals. Visual search, although effective in enhancing knowledge and willingness to pay, did not significantly influence shopping frequency. This distinction highlights that not all AI features alter behavior in the same way; some inform, while others shape.

The findings offer several important implications for practitioners. Fashion retailers can integrate sustainability attributes more strategically within AI-driven styling tools, using them as micro-interventions that surface environmental benefits at moments of decision. Visual search engines may be optimized to privilege sustainable alternatives when algorithmically matching product images. Platform designers can leverage these insights to redesign digital choice architectures, reducing informational overload and creating pathways that subtly reinforce sustainable decision-making. Policymakers and sustainability advocates may also benefit from these insights, as they indicate that digital technologies can be leveraged not only to educate consumers but also to reshape consumption patterns at scale.

This study also offers theoretical implications by demonstrating how S–O–R operates in algorithmically mediated retail environments. Previous studies primarily applied the framework to physical store atmospherics or basic digital cues (Eroglu et al., 2001; Jacoby, 2002). By integrating AI-driven FashionTech into the model, this research extends S–O–R into contexts characterized by high personalization, complex information flows, and real-time algorithmic decision support. The differentiation between exploratory tools (visual search) and directive tools (styling apps) contributes to a more nuanced understanding of how digital stimuli vary in their cognitive and behavioral effects.

Despite these contributions, the study has several limitations inherent to secondary data analysis. First, the reliance on a pre-existing data set constrained the selection of variables and measurement scales, necessitating the use of the available single-item indicators rather than multi-item constructs. Second, the data were self-reported, which may introduce biases such as social desirability or overestimation of sustainable intentions. Third, although the sample was large and internationally diverse, it does not represent all consumer segments equally. Fourth, the cross-sectional nature of the survey limits causal inference. Future research should incorporate experimental or longitudinal designs to better capture changes in sustainability knowledge and behavior over time. Digital trace data—such as clickstream patterns or AI-driven recommendation logs—could also provide more

accurate behavioral insights. Researchers may additionally examine how specific segments, such as heavy shoppers, environmentally conscious consumers, or low-knowledge users, respond differently to AI-driven tools. Finally, further work could explore the role of platform governance, transparency, and algorithmic fairness in shaping sustainable consumption dynamics.

As the data used in this study are cross-sectional, the relationships identified should be interpreted as associations rather than definitive causal effects. While the S–O–R framework provides theoretical justification for directional pathways, the statistical evidence reflects correlational patterns consistent with—but not conclusive for—causal mechanisms. Accordingly, the interpretation of findings avoids deterministic language, favoring phrasing such as “is associated with” or “appears to foster.” Future longitudinal or experimental research is needed to establish causality more rigorously.

In conclusion, the results of this study highlight the potential of AI-driven FashionTech to support more sustainable consumer behavior by enhancing knowledge and guiding consumption decisions. Styling applications appear capable of reducing unnecessary purchases while simultaneously increasing willingness to pay for environmentally responsible products. As digital technologies continue to permeate the fashion industry, embedding sustainability principles within algorithmic systems will become increasingly vital. By revealing how technological stimuli translate into cognitive and behavioral outcomes, this study offers a foundational perspective for designing digital ecosystems that promote responsible, informed, and sustainable fashion consumption.

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