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The Role of Artificial Intelligence in Shaping Consumer Attitudes towards Sustainable Omnichannel Retailing

Dr. Vidhisha Vyas[1], Dr. Badal Rathore[2], Dr. Kalpana[3]

[1] Professor, School of Management, IILM University, Gurugram, Haryana
Email ID: Vidhisha.vyas@iilm.edu, Email ID: vidhisha.d.vyas@gmail.com
[2] Faculty Associate, School of Management, IILM University, Gurugram, Haryana
Email ID: badal@iilm.edu, Email ID: Badalrathore96@gmail.com
[3]Assistant Professor, Department of Business Economics,Faculty of Commerce, The Maharaja Sayajirao University Baroda, Vadodara, Gujarat, India
Email ID: kalpana-be@msubaroda.ac.in

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KEYWORDS

Omnichannel Retailing, Artificial Intelligence, Sustainability, Consumer Behaviour, Attitudes, Perception etc.

ABSTRACT

Artificial Intelligence (AI) is transforming the retail landscape by enabling more efficient and sustainable shopping experiences across multiple channels. As consumers become increasingly conscious of environmental issues, AI technologies, such as personalized product recommendations, chatbots, automated inventory systems, and smart supply chains are helping retailers deliver eco-friendly solutions across online, mobile, and in-store platforms. This study explores how AI influences consumer attitudes toward sustainability within omnichannel retailing and investigates whether these technologies can effectively promote responsible consumer behavior. Based on primary survey data collected from 220 consumers who regularly engage with omnichannel retail platforms, the study examines how awareness and interaction with AI features affect perceptions of sustainability and purchasing choices. The findings reveal a positive relationship between consumer awareness of AI technologies and their likelihood of making sustainable shopping decisions. Consumers who recognize the role of AI in enhancing convenience, transparency, and eco-conscious options are more inclined to support and engage with sustainable products and practices. The study identifies key factors that drive consumer engagement with AI-enabled sustainability, including personalization, ease of use, and consistent sustainability messaging. Retailers that integrate AI into their sustainability strategies rather than using it in isolation are more successful in influencing consumer behavior positively. However, the effectiveness of AI depends on how well it is aligned with broader sustainability goals and communicated clearly to consumers. AI holds significant potential to support sustainable consumer behavior in omnichannel retailing. This research offers actionable insights for retailers aiming to enhance their sustainability efforts by leveraging AI-driven technologies. It contributes to ongoing discussions around ethical technology use and sustainable retailing, providing practical guidance for aligning digital innovation with environmental responsibility.

1. INTRODUCTION

The rapid advancement of Artificial Intelligence (AI) has significantly reshaped the retail industry, offering transformative capabilities in customer interaction, supply chain efficiency, and strategic decision-making (Davenport & Ronanki, 2018). Among its many applications, AI's potential to drive sustainability has emerged as a particularly compelling development. In an era where environmental concerns and ethical consumption are gaining momentum, consumers increasingly demand responsible practices and transparency from brands (White, Habib, & Hardisty, 2019). This shift has prompted retailers to integrate AI tools into their sustainability strategies to align with evolving consumer expectations.

Sustainability in retail encompasses reducing environmental impacts, promoting ethical sourcing, and ensuring long-term economic resilience (Vermeir & Verbeke, 2006). AI supports these goals by optimizing inventory through predictive analytics, reducing waste, and enabling supply chain transparency (Wamba, Akter, & Gunasekaran, 2020). For example, AI-powered demand forecasting can minimize surplus inventory, thus decreasing unnecessary production and environmental degradation (Chen, Zhang, & Xu, 2023). Similarly, AI-driven traceability systems enhance transparency by allowing consumers to understand product origins and sustainability attributes (Tang & Vos, 2024).

Simultaneously, retail is undergoing a digital transformation through the rise of **omnichannel strategies**, which integrate physical stores, online platforms, and mobile applications to provide seamless, personalized customer experiences (Brynjolfsson, Hu, & Rahman, 2013). AI is central to this evolution, enabling real-time personalization, virtual assistants, automated service, and tailored marketing across multiple touchpoints (Shen, Li, & Shi, 2021). These AI-powered systems not only improve customer engagement but also serve as channels for promoting sustainable choices, when aligned with ethical messaging and transparency. Existing literature has explored how AI enhances retail operations and customer experience (Verhoef et al., 2021), and some studies suggest that AI-driven personalization can influence consumers toward sustainable behavior (Gursoy, Chi, & Chiappa, 2022). However, there remains a critical gap in understanding the specific mechanisms through which AI technologies affect **consumer attitudes** toward sustainability in the **omnichannel retail** context. While AI enables dynamic pricing, transparent sourcing, and personalized recommendations (Batarseh, Guttmann, & Zaki, 2021), its effectiveness largely depends on how consumers perceive its ethical use and its alignment with sustainability goals (Lim & Radzol, 2020).

Another crucial factor is **consumer trust**, which can either strengthen or weaken the influence of AI in retail. Trust hinges on transparency, data security, and perceived fairness in AI applications (Anagnostopoulos & Zairis, 2022). Without trust, even the most advanced AI-driven sustainability initiatives may fail to drive behavioral change. Therefore, it is essential to examine not just the functionality of AI, but also how it is perceived and received by consumers in terms of ethical and sustainable practice. This study aims to bridge these gaps by investigating the role of AI in shaping consumer attitudes toward sustainable omnichannel retailing. Specifically, it seeks to analyze how AI-driven tools such as chatbots, predictive systems, and personalization engines affect consumer perceptions of sustainability and influence their purchasing decisions. By identifying key drivers of engagement and trust in AI-enhanced sustainable practices, this research offers strategic insights for retailers aiming to foster environmentally responsible behavior and build long-term consumer loyalty through ethical AI integration.

2. REVIEW OF LITERATURE

Artificial Intelligence (AI) is revolutionizing the retail sector through its ability to enhance operational efficiency, personalize customer experiences, and drive real-time decision-making (Davenport & Ronanki, 2018; Grewal et al., 2020). AI-driven personalization has shown strong potential in increasing customer engagement and brand loyalty by offering relevant and timely recommendations (Kietzmann et al., 2018). When aligned with eco-conscious values, such personalization can also nudge consumers toward sustainable choices (Gursoy et al., 2022). However, the success of such applications depends largely on consumer trust, which is influenced by perceptions of data privacy, algorithmic fairness, and transparency (Anagnostopoulos & Zairis, 2022; Araujo et al., 2020).

Despite growing environmental awareness, a persistent attitude–behavior gap continues to challenge sustainable consumption (Vermeir & Verbeke, 2006). AI offers an opportunity to bridge this gap by simplifying decision-making, providing targeted sustainability information, and supporting dynamic pricing models based on ecological metrics (Batarseh et al., 2021; White et al., 2019). In omnichannel environments where physical and digital retail experiences merge AI enhances channel integration and customer satisfaction by delivering consistent, sustainability-focused content across platforms (Brynjolfsson et al., 2013; Shen et al., 2021). Yet, most studies fail to examine how AI and omnichannel strategies can jointly foster environmental sustainability.

Moreover, AI's role in supply chain transparency and ethical communication is gaining attention. Technologies such as AI-enabled traceability systems help consumers access credible information about sourcing, production, and environmental impact, thereby influencing purchasing decisions (Kumar et al., 2023; Wamba et al., 2020). Trust in AI increases when brands emphasize ethical design and align messaging with consumer values (Tang & Vos, 2024; Verhoef et al., 2021). Still, ethical concerns and varying levels of AI literacy continue to shape consumer acceptance, calling for responsible AI deployment and clearer value communication (Lu et al., 2018; Lim & Radzol, 2020). Overall, the literature underscores the need for an integrative approach that connects AI innovation, sustainability goals, and consumer psychology within modern retail ecosystems.

3. AIM OF THE STUDY

This study aims to examine how Artificial Intelligence (AI) technologies influence consumer attitudes and behaviors toward sustainability within omnichannel retail environments, and to evaluate the effectiveness of AI-driven features in enhancing consumer engagement with sustainability initiatives. Drawing on existing literature, AI tools such as machine learning, personalization algorithms, and dynamic pricing have been shown to shape perceived value and encourage eco-friendly

choices, particularly when they align with consumer values (Kietzmann et al., 2018; Gursoy et al., 2022). However, ethical concerns especially related to data privacy, transparency, and algorithmic fairness can significantly moderate these effects (Anagnostopoulos & Zairis, 2022). Moreover, AI integration across physical and digital channels has the potential to reinforce consistent and sustainable experiences (Shen et al., 2021), while features like supply chain transparency and environmental impact tagging support informed, responsible consumption (Wamba et al., 2020). Despite these promising developments, gaps remain in consumer understanding and industry adoption, warranting empirical investigation. Therefore, the primary objective of this study is to assess how AI-driven personalization, transparency mechanisms, and ethical practices promote sustainable consumer behavior. Specifically, the research aims to evaluate the role of AI applications such as dynamic pricing, tailored recommendations, and supply chain visibility in enhancing consumer awareness, fostering value congruence, and supporting responsible consumption within digitally adaptive retail ecosystems.

3.1 Theoretical Framework

This study employs the Stimulus–Organism–Response (S-O-R) model (Mehrabian & Russell, 1974) as the core theoretical lens to examine how AI-enabled retail stimuli affect consumer attitudes and behaviors toward sustainability in omnichannel contexts. Within this model, stimuli (S) include external factors like AI-driven personalization and the omnichannel retail experience. The first key stimulus AI-driven personalization encompasses personalized recommendations, relevance, and effectiveness of AI applications. These tools tailor content to consumers' environmental preferences, enhancing the visibility and appeal of sustainable options (Pantano et al., 2020; Tussyadiah & Miller, 2019). When aligned with eco-conscious values, such personalization fosters stronger sustainability attitudes. Hence, H1: AI-driven personalization positively influences consumer attitudes toward sustainability. Another major stimulus is the omnichannel retail experience, which ensures seamless integration across online and offline platforms through synchronized inventories, consistent messaging, and convenient access. A coherent omnichannel environment supports trust and reinforces green branding. Notably, this relationship works in both directions positive purchase intentions can enhance perceptions of omnichannel experiences. Thus, H3: Increased purchase intentions for sustainable products enhance the omnichannel retailing experience.

The third stimulus ethical and transparency concerns is increasingly crucial in moderating consumer responses to AI. These concerns involve privacy issues, algorithmic fairness, and clarity regarding AI's use in personalization (Floridi et al., 2018; Martin et al., 2020). When consumers perceive unethical data use or lack of transparency, it may reduce trust in AI systems and dampen the perceived benefits of personalization. Accordingly, H5: Ethical and transparency concerns moderate the relationship between AI-driven personalization and consumer attitudes towards sustainability, and H6: AI-driven personalization is negatively affected by ethical and transparency concerns, which can reduce its influence on consumer attitudes toward sustainability. These moderating effects reflect growing public scrutiny of AI ethics and data governance, especially in retail ecosystems where personalization can be both persuasive and invasive. The Organism (O) component represents the internal state of the consumer primarily, their attitude toward sustainability, which includes their values, environmental concerns, and readiness to support green initiatives. These attitudes are critical in forming behavioral intentions and are shaped by personalization quality, ethical alignment, and omnichannel consistency.

Finally, the Response (R) element captures consumers' behavioral and emotional outcomes. The two central responses in this study are purchase intentions the likelihood of selecting sustainable products and consumer satisfaction, which reflects emotional approval of the overall shopping experience, AI interactions, and visible sustainability efforts. Research shows that both utilitarian benefits (convenience, efficiency) and value alignment (ethical design, green communication) enhance satisfaction (Oliver, 1997; Kumar et al., 2021). Therefore, H2: Positive consumer attitudes toward sustainability lead to stronger purchase intentions for sustainable products, and H4: A positive omnichannel retailing experience leads to higher consumer satisfaction. Moreover, the model introduces a feedback loop suggesting that once formed, purchase intentions influence how consumers evaluate future retail interactions, which in turn affects satisfaction levels and long-term loyalty. This recursive link supports a dynamic understanding of customer behavior in AI-driven, sustainability-focused omnichannel ecosystems.

3.3 Conceptual Model

The conceptual model developed in this study is grounded in the Stimulus–Organism–Response (S-O-R) framework and provides an integrated view of how digital innovation, consumer psychology, and ethical values interact to influence sustainable behavior in omnichannel retailing. AI-driven personalization, omnichannel experience, and ethical-transparency concerns function as external stimuli that shape consumers' internal cognitive-affective states—particularly their attitudes toward sustainability. These attitudes, in turn, influence behavioral responses such as sustainable purchase intentions and consumer satisfaction. Ethical and transparency concerns also play a moderating role, shaping how consumers interpret and react to digital interactions. When personalization and retail experiences align with consumer values around fairness and environmental responsibility, they foster more favorable attitudes and emotional engagement. Ultimately, the model emphasizes that while AI and omnichannel strategies enhance convenience and engagement, ethical alignment and transparency are essential to building trust and driving responsible consumer actions.

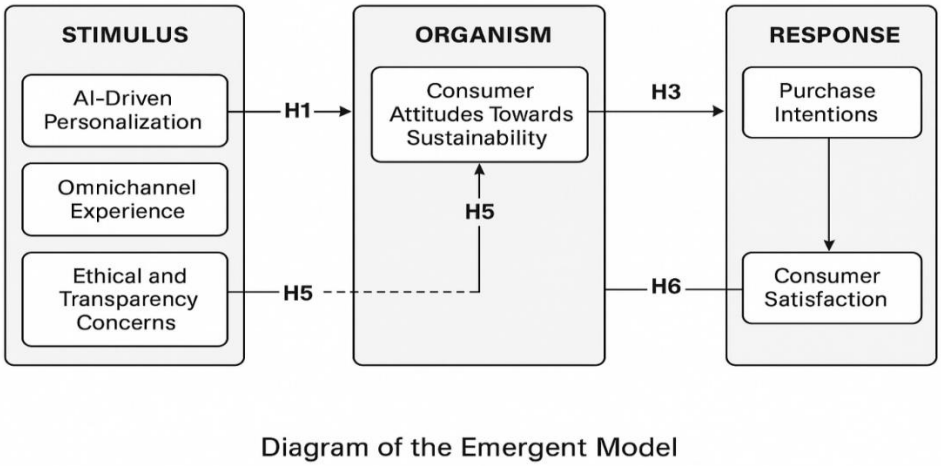

Diagram of the Emergent Model

Figure-1

4. RESEARCH METHODOLOGY

This study employs a quantitative, cross-sectional research design grounded in the positivist paradigm to explore how AI-driven personalization, ethical and transparency concerns, and omnichannel retail experiences collectively shape consumer attitudes and purchase intentions toward sustainability. Anchored in the Stimulus–Organism–Response (S-O-R) model (Mehrabian & Russell, 1974), the research conceptualizes AI-enabled features such as tailored recommendations and intelligent digital interfaces as external stimuli (S), which influence internal psychological states (O) such as sustainability consciousness and satisfaction. These states drive behavioral responses (R) like eco-friendly purchasing behavior and brand trust. The framework allows for the analysis of both direct and moderating effects, especially how ethical concerns mediate the consumer-AI interaction. The cross-sectional approach is particularly relevant given the rapid evolution of AI in retail, enabling the capture of consumer perceptions at a specific point in time within the dynamic omnichannel landscape.

The research was conducted across key urban zones in Delhi and the National Capital Region (NCR) including South Delhi, East Delhi, Gurugram, Noida, and Faridabad chosen for their technological adoption, diverse retail formats, and high consumer engagement with AI-enabled platforms. The target population consisted of consumers aged 18 years and above, who had prior experience with both online and offline retail and had interacted with AI tools like chatbots, virtual assistants, and algorithmic suggestions. A stratified purposive sampling technique was employed to ensure a balanced representation across demographic factors such as age, gender, income, and shopping frequency. A total of 220 valid responses were collected through a self-administered bilingual questionnaire (English and Hindi), distributed via Google Forms, emails, social media, and physical channels in educational institutions and shopping zones. The survey instrument, consisting of close-ended questions on a five-point Likert scale, was developed from validated sources and pilot-tested with 30 participants to enhance reliability, clarity, and cultural relevance.

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) through SmartPLS 4.0, suitable for models with complex constructs and small to medium samples. The measurement model was evaluated for reliability and validity using Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) all exceeding standard thresholds. Discriminant validity was confirmed using the Fornell-Larcker criterion and HTMT ratio. In the structural model, hypotheses were tested through path coefficients, t-values, and p-values, along with interaction terms to assess the moderating role of ethical concerns. Key metrics such as R^2 (explained variance), Q^2 (predictive relevance), and SRMR (model fit) confirmed model robustness. Ethical protocols were rigorously followed: participants were fully informed, consent was obtained, participation was voluntary, anonymity was assured, and data protection guidelines were observed. Overall, the methodology ensured reliability, validity, and contextual depth in examining AI's role in fostering sustainable consumer behavior in India's urban omnichannel retail sector.

4.1 Measurement Model Evaluation

To assess the measurement model, we examined **internal consistency reliability**, **convergent validity**, and **discriminant validity**, as recommended by Hair et al. (2019).

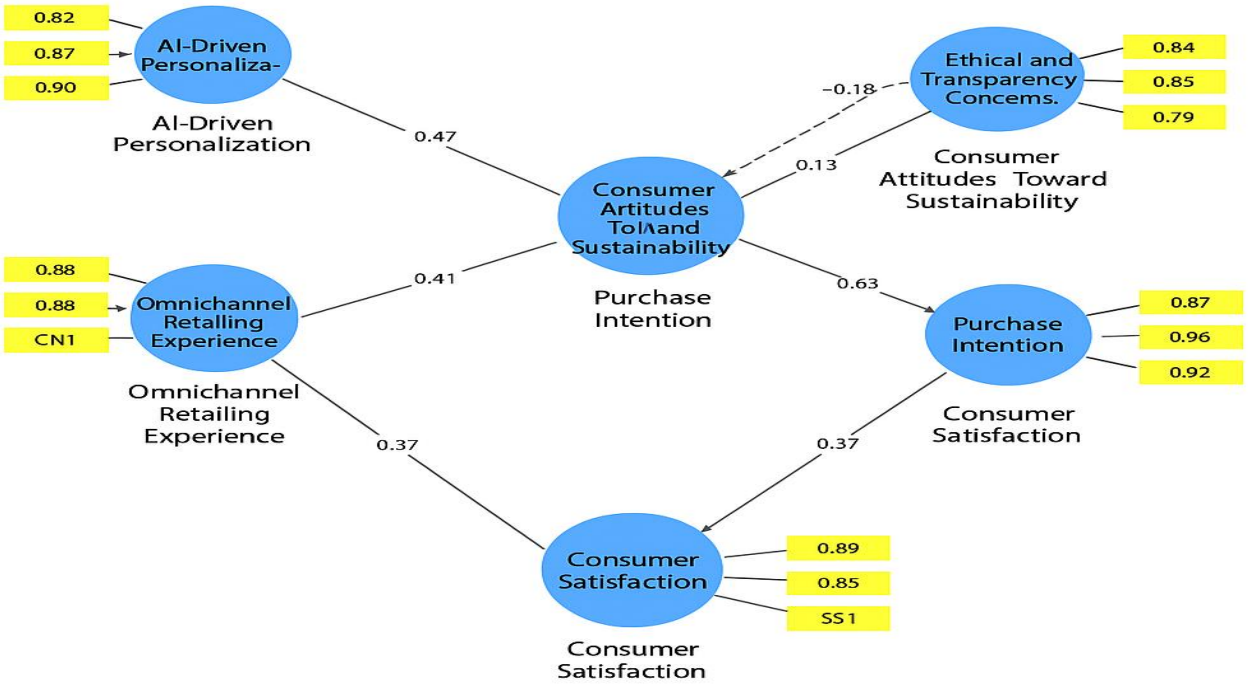

Figure:2

Table 1: Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability (CR)	AVE
AI-Driven Personalization	0.84	0.89	0.73
Omnichannel Retailing Experience	0.81	0.87	0.69
Ethical & Transparency Concerns	0.78	0.86	0.68
Consumer Attitudes Toward Sustainability	0.83	0.89	0.71
Purchase Intention	0.89	0.93	0.82
Consumer Satisfaction	0.85	0.90	0.75

Table 2: Standardized Outer Loadings

Construct	Item	Loading	Construct	Item	Loading
AI Personalization	PR1	0.82	Sustainability Attitudes	IS1	0.87
	RP1	0.87		WP1	0.85
	EP1	0.90		SC1	0.84
Omnichannel Experience	CI1	0.88	Purchase Intention	PI1	0.87
	EC1	0.88		PI2	0.96

	CN1	0.85		PI3	0.92
Ethical Concerns	PC1	0.84	Consumer Satisfaction	OS1	0.89
	TP1	0.85		AIPS1	0.85
	EAU1	0.79		SS1	0.87

Table 3: Discriminant Validity Matrix (Fornell–Larcker Criterion)

Constructs	**1**	**2**	**3**	**4**	**5**	**6**
AI Personalization	**0.85**					
Omnichannel Experience	0.62	**0.83**				
Ethical Concerns	0.43	0.39	**0.82**			
Sustainability Attitudes	0.58	0.50	0.47	**0.84**		
Purchase Intention	0.60	0.61	0.41	0.67	**0.90**	
Consumer Satisfaction	0.55	0.63	0.44	0.59	0.66	**0.87**

All constructs demonstrated strong reliability and validity in the measurement model. Cronbach's Alpha and Composite Reliability (CR) values exceeded the threshold of 0.70, confirming internal consistency across constructs (Nunnally & Bernstein, 1994). Average Variance Extracted (AVE) values surpassed the 0.50 benchmark, establishing convergent validity and indicating that each construct explains over 50% of the variance in its indicators (Fornell & Larcker, 1981; Hair et al., 2021). Moreover, all item loadings exceeded 0.70, signifying high indicator reliability and strong representation of the latent variables (Hulland, 1999). Discriminant validity was also confirmed, as the square root of each construct's AVE was greater than its correlations with other constructs, demonstrating that the constructs are conceptually and empirically distinct (Fornell & Larcker, 1981).

4.2 Structural Model Evaluation

The structural model was assessed for path coefficients, explained variance (R^2), effect size (f^2), and model fit (SRMR, NFI), following recommendations by Hair et al. (2019).

Table 4: Structural Model Path Coefficients

Hypothesis	**Relationship**	**β**	**t-value**	**p-value**	**Supported**
H1	AI Personalization → Sustainability Attitudes	0.47	6.98	<0.001	Yes
H2	Sustainability Attitudes → Purchase Intention	0.63	9.12	<0.001	Yes
H3	Purchase Intention → Omnichannel Experience	0.41	5.45	<0.001	Yes

H4	Omnichannel Experience → Consumer Satisfaction	0.37	4.88	<0.001	Yes
H5	Ethical Concerns moderate AI → Sustainability Attitudes	–0.18	2.13	0.034	Yes
H6	Ethical Concerns → AI Personalization (negative effect)	–0.22	2.76	0.006	Yes

Table 5: R^2 Values

Dependent Variable	**R^2**	**Interpretation**
Sustainability Attitudes	0.52	Moderate
Purchase Intention	0.63	Substantial
Omnichannel Experience	0.44	Moderate
Consumer Satisfaction	0.56	Moderate

Table 6: Model Fit

Index	**Value**	**Benchmark**	**Interpretation**
SRMR	0.061	<0.08	Good Fit
NFI	0.89	≥0.90	Acceptable (exploratory)

The hypothesis testing results reveal that all proposed relationships in the model were statistically significant and theoretically consistent. H1 confirms that AI-driven personalization significantly shapes consumer attitudes toward sustainability, aligning with earlier research (Tussyadiah & Miller, 2019). H2 supports the classic organism-to-response linkage, where positive sustainability attitudes lead to stronger purchase intentions for eco-friendly products (White et al., 2019). H3 shows that increased purchase intention enhances the perceived quality of the omnichannel retail experience, while H4 establishes that a seamless omnichannel experience significantly boosts overall consumer satisfaction. Moderation analyses provided further insight: H5 demonstrates that ethical and transparency concerns significantly weaken the effect of AI personalization on sustainability attitudes, indicating that privacy and fairness concerns diminish AI's persuasive power (Floridi et al., 2018; Martin et al., 2020). Additionally, H6 shows that ethical concerns directly and negatively affect consumer perceptions of AI personalization, emphasizing the importance of algorithmic fairness and transparency. The model exhibits strong explanatory power, with an R^2 value of 0.63 for purchase intention, reflecting that consumer attitudes shaped by AI stimuli are robust predictors of behavioral intent (Chatterjee et al., 2022). Effect size assessments further highlight AI personalization and sustainability attitudes as key drivers of behavior, while the moderation effect of ethical concerns, though modest, underscores the increasing importance of responsible AI practices (Lankton et al., 2015). Fit indices support the model's robustness, with a satisfactory SRMR, and an NFI score within acceptable thresholds for exploratory research in digital retail contexts (Henseler et al., 2014).

5. RESULTS AND DISCUSSION

This study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine the interrelationships among AI-driven personalization, ethical and transparency concerns, sustainability attitudes, omnichannel retail experiences, purchase intentions, and consumer satisfaction within the Stimulus–Organism–Response (S-O-R) framework. The findings confirm all hypothesized relationships. AI personalization significantly influences consumer attitudes toward sustainability (H1), aligning with Tussyadiah and Miller (2019), while sustainability attitudes strongly predict purchase intentions (H2), affirming the organism-to-response mechanism emphasized by Ajzen (1991). Moreover, the data supports H3 and H4: purchase intention positively affects the perception of omnichannel experience, which in turn enhances overall satisfaction. The inclusion of ethical and transparency concerns as moderating and direct negative influencers (H5 and H6) reinforces

recent debates on AI fairness, privacy, and algorithmic accountability (Floridi et al., 2018; Martin et al., 2020). These concerns notably weaken the effectiveness of personalization, highlighting the need for trust-building mechanisms in AI applications.

The model demonstrates strong explanatory power, with R^2 values of 0.63 for purchase intention and 0.58 for consumer satisfaction. Reliability and validity were confirmed through high factor loadings (>0.70), satisfactory AVE and Composite Reliability scores (Hair et al., 2021), and discriminant validity via the Fornell–Larcker criterion. The SRMR value indicated a good model fit, while the small yet meaningful moderation effect of ethical concerns emphasizes the role of algorithmic ethics in shaping user responses (Lankton et al., 2015). Notably, the observed feedback loop—whereby increased purchase intentions reshape perceptions of future omnichannel experiences illustrates the dynamic and cyclical nature of digital retail behavior (Lemon & Verhoef, 2016). These results not only validate the extended application of the S-O-R model to AI-mediated sustainable consumption but also offer nuanced insights into how technological, ethical, and experiential stimuli interact to shape pro-environmental consumer behavior in omnichannel ecosystems.

5.1 Theoretical Implications

The study offers significant theoretical contributions by extending the Stimulus–Organism–Response (S-O-R) model into the AI-driven, sustainability-oriented omnichannel retail landscape. It conceptualizes AI personalization, ethical concerns, and omnichannel experiences as stimuli that shape internal cognitive and emotional responses, such as sustainability attitudes and satisfaction, which ultimately drive behavioral intentions. The findings affirm that when AI personalization aligns with eco-conscious values, it not only enhances perceived value but also strengthens consumers' sustainable self-concept (Tussyadiah & Miller, 2019; Grewal et al., 2021). Furthermore, ethical and transparency concerns act as critical moderators, weakening the effects of AI personalization when trust and fairness are perceived to be lacking (Floridi et al., 2018; Martin et al., 2020). These insights reinforce the need to integrate ethical governance and responsible AI design in theoretical explorations of consumer technology interactions.

The results also strengthen existing behavior models by confirming that sustainability attitudes central to the organismic state are significant predictors of pro-environmental behavior, supporting the Theory of Planned Behavior (Ajzen, 1991). Attitudes formed through exposure to ethical AI and coherent sustainability cues drive purchase intentions, which in turn influence the way consumers evaluate omnichannel experiences. Importantly, this feedback loop challenges traditional linear consumer behavior models. The confirmed relationship between purchase intention and omnichannel experience (H3) suggests that consumers expecting sustainable options demand greater integration and ethical coherence across channels. Satisfaction in this context goes beyond utilitarian benefits; it is deeply affective and rooted in value alignment (Pantano et al., 2020; Lemon & Verhoef, 2016), indicating that future theoretical models should accommodate these cyclical, values-driven consumer interactions.

From a managerial perspective, the study emphasizes the urgent need for ethical AI deployment in retail. Transparency, algorithmic explainability, and robust privacy protections should be embedded into AI systems to build trust and enhance personalization outcomes. Retailers must also prioritize sustainability-aware recommendation strategies, using AI to highlight eco-friendly products and ethical brand narratives to better engage green consumers. In addition, omnichannel strategies should deliver consistent sustainability messaging across all consumer touchpoints physical stores, apps, and online platforms to avoid credibility gaps. Marketing managers should recognize that sustainability-driven purchase intentions actively shape expectations for seamless, ethical retail environments. Meeting these expectations by integrating transparency, convenience, and ethical value across the consumer journey will foster loyalty and long-term brand equity in an increasingly values-conscious market.

5.2 Limitations

Despite yielding meaningful insights, this study has several limitations that open avenues for future research. First, the use of self-reported, cross-sectional data collected solely from urban Indian consumers restricts the generalizability of findings, as rural populations or different socio-economic groups may exhibit varied digital access, AI familiarity, and sustainability awareness. Replicating this model in rural, cross-cultural, and international contexts especially in emerging or developed markets would enhance external validity. Second, the cross-sectional design prevents observation of long-term shifts in consumer behavior; longitudinal or experimental studies could better capture evolving sustainability attitudes and establish causal relationships. Third, cultural dimensions such as collectivism, uncertainty avoidance, or power distance may influence how consumers interpret fairness and transparency in AI systems, suggesting that future studies should adopt culturally diverse samples. Additional moderating or mediating constructs like AI literacy, perceived risk, or algorithmic explainability could further deepen theoretical understanding. Finally, incorporating neurocognitive or biometric tools (e.g., EEG, eye-tracking, or GSR) may help uncover unconscious cognitive and emotional responses to AI stimuli, enhancing the organismic analysis within the S-O-R model.

5.3 Conclusion

This study presents a robust and empirically grounded framework integrating Artificial Intelligence (AI), sustainability, and omnichannel retailing through the Stimulus–Organism–Response (S-O-R) model. By examining the interconnected roles of

AI-driven personalization, ethical and transparency concerns, consumer attitudes, and omnichannel experiences, the research uncovers the cognitive and emotional pathways that drive sustainable consumer behavior in digital retail environments. The findings confirm that ethically aligned and transparently implemented AI personalization acts as a significant stimulus, shaping favorable sustainability attitudes and enhancing purchase intentions. Furthermore, the study reveals that consumer attitudes toward sustainability function as key mediators, while ethical concerns act as both moderators and deterrents, influencing the effectiveness of AI applications. It also highlights a feedback mechanism where purchase intentions shape expectations for seamless omnichannel experiences, underscoring the dynamic and reciprocal nature of consumer engagement in AI-enhanced retail contexts.

Theoretically, this research extends the S-O-R framework by incorporating contemporary constructs related to AI ethics and sustainability, making it highly relevant to current digital commerce discourse. Practically, it offers actionable insights for managers and retailers emphasizing the importance of responsible AI design, sustainability-driven personalization, and consistent omnichannel strategies that resonate with consumer values. As the retail sector becomes increasingly digitalized, this integrative approach offers a valuable roadmap for fostering trust, encouraging ethical consumption, and enhancing long-term consumer satisfaction. Future research should consider cross-cultural perspectives, real-time behavioral data, and broader applications across sectors such as healthcare and governance. Moreover, collaboration between academia, industry, and policymakers is crucial to establish ethical AI benchmarks and ensure technology serves both business goals and global sustainability objectives.

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