Impact of Augmented Reality on Behavioral Intention of Consumers towards Green Products in Retail Store

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Abstract
This research examines the effect of Augmented Reality (AR) on consumer behavior towards green products in retail contexts using the Technology Acceptance Model (TAM) to investigate the relationships among AR interaction (I-AR), attitude (ATT), price (PR), and behavioral intention (BIUG). With the AR capabilities of Snapchat and a quantitative study approach, data were collected with a questionnaire survey using a 5-point Likert scale and analyzed with Smart PLS software. Findings indicate that AR has a positive effect on consumer attitudes towards green products, thereby increasing purchase probability, with price acting as a moderator that amplifies the effect of AR on behavioral intention at elevated prices. The research concludes that AR successfully resolves the information deficiency in retail environments, providing digital augmentations of physical products and enabling enhanced decision-making and interaction with sustainability-focused products. Companies can leverage AR to establish a competitive advantage, enhance customer experience, and induce environmentally friendly buying behavior. Geographic limitations and reliance on self-reported measures may compromise generalizability of the results, necessitating future studies with heterogeneous consumer groups and longitudinal approaches.

Keywords: Augmented Reality (AR), Consumer Behavior, Green Products, Technology Acceptance Model (TAM), Behavioral Intention

1.   Introduction
The increase in concern about the environment globally is making people focus more on sustainability. Interest in green products has certainly increased; however, they are not readily adopted because people do not have access to credible product information, there is little consumer participation, and they are very price sensitive. Many find it impossible to ensure whether a product is really sustainable, hence they become skeptical and hesitant to adopt green choices. The new technology termed Augmented Reality (AR) has the ability to solve these problems by providing instant information, building trust among consumers, and making purchase of sustainable products more fun and offers user interaction. With the help of AR, users can visualize information, interact with, and learn about environmentally sustainable products in a retail setting (Choudhury et al., 2024). This article describes the impact of AR technology on consumer participation towards green products by showcasing them, teaching them, and involving them. The attempts are made to provide evidences of the use of AR in green retail which aims at changing the purchasing behavior of consumers to environmentally friendly ones. When the perceived value doesn't match with the actual value offers through the products, it leads to stress for the consumers (Gaikwad & Bhattacharya, 2024).

2.   Objective of Study
The aim of this research paper is to analyze the impact of Augmented Reality (AR) on consumer behavioral intentions towards purchasing green products in a retail context. The study seeks to

achieve the following objectives:

- To understanding AR's Impact on Consumer Behavior and Extending the TAM Model
- To identifying Key Barriers to AR Adoption in Sustainable Retail
- To evaluating the Business and Marketing Potential of AR in Green Retail
- To establishing a foundation for future research on AR and sustainability

3. Scope of Study

This study explores the impact of Augmented Reality (AR) on consumer engagement, trust, and purchase intention toward green products in retail. The scope includes:

3.1 Industry Focus

Augmented Reality (AR) is playing a transformative role in promoting sustainable consumer choices across various sectors. In the realm of sustainable fashion, AR virtual try-on technology allows customers to engage with eco-friendly clothing brands without physical trials, reducing the need for returns and overproduction. This enhances both user experience and environmental responsibility by supporting conscious consumption. Similarly, green beauty and skincare brands are utilizing AR to scan and display ingredients in real-time, emphasizing their organic and cruelty-free nature. Consumers can now verify product authenticity and environmental impact, which builds trust and encourages eco-conscious buying behavior. In the domain of eco-friendly home appliances, AR demonstrations enable users to interactively explore energy-efficient devices such as refrigerators, washing machines, and smart thermostats. This hands-on digital experience highlights the appliances' sustainable features and helps buyers make informed decisions aligned with environmental conservation. Sustainable food and beverages are also leveraging AR technology to provide transparency about a product's carbon footprint and ethical sourcing. Consumers can scan labels to instantly access detailed data on how organic and environmentally-friendly a product is, fostering greater accountability in food consumption. Finally, electric vehicles (EVs) and other sustainable transportation options benefit from immersive AR showroom experiences (Gaikwad, 2024). Users can visualize EV models, understand battery range, carbon emissions, and overall cost-effectiveness, all in an engaging and interactive format. This not only simplifies complex information but also encourages adoption of greener transport solutions. By integrating AR across these sustainable sectors, businesses are not only enhancing consumer engagement but also advancing the global mission of environmental responsibility.

3.2 Target Audience: This study predominantly centers on consumers, retailers & brands, academia & researchers.

3.3 Research Framework

The study applies the Technology Acceptance Model (TAM) and extends it by incorporating: External Variable: Interaction with AR (I-AR) to evaluate engagement; Mediator Variable: Attitude (ATT) for behavioral effect evaluation; Moderator Variable: Price (PR) for evaluating the impact of AR induced sustainability adoption on price. The study employs a cross-sectional design that entails primary data collection from respondents that use Snapchat AR in green retailing. Hypotheses testing is done through structural equation modeling (SEM) with the aid of Smart PLS software.

4. Literature Review

Maram Ehab et al. (2020)-This study examines how AR enhances consumer engagement and purchase intention in physical and online stores. The authors found that AR improves consumer trust by providing interactive experiences that reduce uncertainty. AR-powered product visualization increases purchase likelihood and brand loyalty. Higher immersion levels in AR experiences lead to greater emotional connection with products. Relevance to This Study: This research supports our hypothesis that Interaction with AR (I-AR) influences Attitude (ATT) toward green products.

Muhammad Saleem et al. (2021)-This paper explores how AR influences consumer perceptions of sustainable and eco-friendly products. Key findings included AR increases transparency by providing real-time product sustainability information. Consumers using AR felt more confident about eco-friendly product claims, reducing skepticism about green- washing. AR-driven education led to long-term sustainable purchasing behavior. This study aligns with our objective to bridge the sustainability information gap using AR.

Rekha Attri et al., (2024)-This research investigates how price influences AR's impact on purchase behavior. Key takeaways include: Consumers are more likely to trust premium-priced sustainable products when AR provides transparency. AR enhances the perceived value of green products, making consumers willing to pay higher prices. The moderating effect of price (PR) strengthens the relationship between AR engagement and purchase intention. Relevance to This Study: Supports our hypothesis that Price (PR) moderates the effect of I-AR on BIUG (Behavioral Intention to Use Green Products).

Huang & Liao (2022)- This study examines the relationship between AR interaction, consumer attitude, and purchasing decisions. The authors found that attitude (ATT) fully mediates the effect of AR engagement on behavioral intention. AR experiences positively shape consumer perceptions, reducing decision anxiety. Stronger AR engagement leads to a higher likelihood of purchasing eco-friendly products. The study confirms our hypothesis that Attitude (ATT) mediates the relationship between I-AR and BIUG.

Wang et al. (2023)-This study focuses on how AR-driven trust influences sustainable shopping behavior. The research highlighted that AR reduces skepticism toward green product claims by offering interactive verification tools. Consumers prefer brands with AR-driven transparency in sustainability disclosures. AR gamification and reward-based engagement increase long-term eco-friendly purchasing behavior. Relevance to This Study: Supports our argument that AR enhances consumer trust, leading to higher adoption of green products.

- **Research Gaps Identified**

While there has been interest in Augmented Reality (AR) within retail and e-commerce, its use in green retail and eco-friendly product use is still lacking attention. The following research gaps have been identified: Most research on AR within retail revolves around the fashion and beauty sectors, with very little literature available on the impact of AR on consumer's sustainable purchasing behavior. There is limited data available to assess the impact AR driven experiences have on purchasing behaviors towards green products. There is often apprehensiveness surrounding purchasing green products because of a lack of credibility or fear of greenwashing (claiming to be sustainable when not). Very few studies exist analyzing the impact of AR's interactive features on trust in environmentally friendly products (e.g., ingredient scanning, carbon footprint displays). Most AR-related studies do not incorporate

mediator and moderator effects into consumer decision-making models. This study extends the Technology Acceptance Model (TAM) by integrating: External Variable: Interaction with AR (I-AR), mediator Variable: Attitude (ATT) and moderator Variable: Price (PR). Consumers tend to consider more as sustainable, thereby resulting in lower adoption rates. There is a gap in the literature on how AR affects consumers' perceptions of paying a higher price for environmentally-friendly products.

The adoption of AR technology is relatively slow due to the lack of familiarity from many consumers and there is scant attention given to UX (user experience) issues and their impact on engagement with AR-based green retail services. There is no comprehensive schema for AR labeling and tracking sustainability within the retail industry and the disparity among the brands leads to consumers feeling doubtful about the green initiatives presented by the products. There is a high prevalence of the use of AR in the fashion and beauty industries; however, green retailers have been more reluctant to embrace it. For many businesses, the high costs associated with development and integration are often seen as barriers to utilizing AR in sustainability marketing. AR has helped personalize shopping experiences in areas such as fashion (i.e., virtual try-ons), but not in providing personal recommendations for sustainability (e.g., suggesting eco-friendly options based on the consumer's purchase history).

5. Hypothesis
This study extends the Technology Acceptance Model (TAM) by introducing Interaction with AR (I-AR), Attitude (ATT), and Price (PR) as external, mediator, and moderator variables. The hypotheses are formulated as follows:

5.1 Direct Relationships
H1: Relationship between Interaction with AR (I-AR) and Attitude (ATT)
Null Hypothesis ($H1_0$): There is no significant relationship between Interaction with AR (I-AR) and Attitude (ATT).
Alternate Hypothesis (H1): There is a significant positive relationship between Interaction with AR (I-AR) and Attitude (ATT).
H2: Relationship Between Attitude (ATT) and Behavioral Intention to Use Green Products (BIUG)
Null Hypothesis ($H2_0$): There is no significant relationship between Attitude (ATT) and Behavioral Intention to Use Green Products (BIUG).
Alternate Hypothesis (H2): Attitude (ATT) has a significant positive impact on Behavioral Intention to Use Green Products (BIUG).
H3: Relationship Between Interaction with AR (I-AR) and Behavioral Intention to Use Green Products (BIUG)
Null Hypothesis ($H3_0$): There is no significant relationship between Interaction with AR (I-AR) and Behavioral
Intention to Use Green Products (BIUG).
Alternate Hypothesis (H3): Interaction with AR (I-AR) has a significant positive impact on Behavioral Intention to Use Green Products (BIUG).

5.2 Mediation Effect
H4: Mediating Role of Attitude (ATT) between Interaction with AR (I-AR) and

Behavioral Intention to Use Green Products (BIUG)

Null Hypothesis (H4$_0$): Attitude (ATT) does not mediate the relationship between Interaction with AR (I-AR) and Behavioral Intention to Use Green Products (BIUG).

Alternate Hypothesis (H4): Attitude (ATT) mediates the relationship between Interaction with AR (I-AR) and Behavioral Intention to Use Green Products (BIUG).

7.3 Moderation Effect

H5: Moderating Role of Price (PR) in the Relationship between Interaction with AR (I-AR) and Behavioral Intention to Use Green Products (BIUG)

Null Hypothesis (H5$_0$): Price (PR) does not moderate the relationship between Interaction with AR (I-AR) and Behavioral Intention to Use Green Products (BIUG).

Alternate Hypothesis (H5): Price (PR) moderates the relationship between Interaction with AR (I-AR) and Behavioral Intention to Use Green Products (BIUG).

6.   Research Methodology

This study employs a quantitative research design to investigate the impact of Augmented Reality (AR) on consumer behavioral intentions toward green products in retail using the Technology Acceptance Model (TAM). The research follows a cross-sectional and deductive approach, with data collected from consumers who have interacted with Snapchat's AR feature in a green retail context.

Research Design: This study follows a deductive approach, where existing theories (TAM) are tested with empirical data. The research is cross-sectional, meaning data is collected at a single point in time to analyze consumer perceptions and behavior regarding AR-enabled sustainable shopping.

Table 1: Hypothesis Development

| Label	Link	Relationship	Theory/Logic Support
H1	I-AR → ATT	+ve / -ve	Technology Acceptance Model (TAM)
H2	ATT → BIUG	+ve / -ve	Technology Acceptance Model (TAM)
H3	I-AR → BIUG	+ve / -ve	Technology Acceptance Model (TAM)
H4	I-AR → ATT → BIUG	+ve / -ve	The more a user interacts with AR interface, the more likely it is that the user will consider using it for purchase decision.
H5	I-AR → BIUG ↑ PR	+ve / -ve	Price is the factor which impacts the relationship between interaction and behaviour.
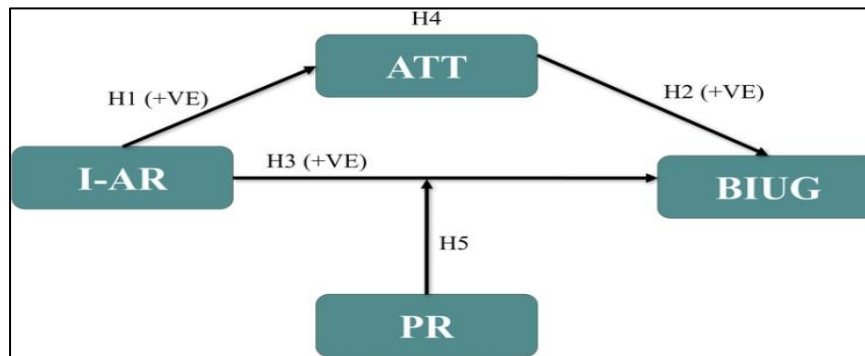
Figure 1: Hypothesis Development

Theoretical Framework: Extended Technology Acceptance Model (TAM)
The Technology Acceptance Model (TAM) is extended by incorporating:
- External Variable: Interaction with AR (I-AR) to analyze consumer engagement.
- Mediator Variable: Attitude (ATT) to examine how perceptions influence purchase behavior.
- Moderator Variable: Price (PR) to assess its effect on AR-driven green product adoption. Justification for TAM Usage:

TAM has applicability for studying consumer behavior and acceptance of AR in green retailing. Perceived usefulness, Perceived ease of use, and engagement all have considerable impact on buying behavior.

Data Collection Method: Survey-based approach using a structured questionnaire; Prerequisite for participation: Respondents must have used Snapchat's AR shopping feature before answering the survey and the data was collected online via Google Forms and distributed through social media, e-commerce platforms, and AR-enabled brand pages.

Sampling Method & Target Audience: Sampling Technique: Convenience Sampling (participants were selected based on accessibility and willingness to participate). Sample Size: 400 respondents from Mumbai, India.

Target Participants: Consumers who actively use AR for shopping; Individuals interested in green and sustainable products; Age group: 18–45 years (tech-savvy and sustainability-conscious shoppers).

Reliability & Validity of the Experiment
Internal Reliability: Cronbach's Alpha and Composite Reliability (CR) were measured to ensure internal consistency of survey items.

Construct Validity: Convergent Validity: Tested using Average Variance Extracted (AVE).

Table 2: Factor Loadings, Reliability and Validity

	FACTOR LOADINGS	CRONBACH'S ALPHA	COMPOSITE RELIABILITY (rho_a)	COMPOSITE RELIABILITY (rho_c)	AVE

I-AR1 **I-AR2** **I-AR3**	0.883 0.919 0.888	0.878	0.880	0.925	0.805
ATT1 **ATT2** **ATT3**	0.826 0.763 0.826	0.743	0.777	0.847	0.649
PR1 **PR2** **PR3**	0.884 0.864 0.791	0.805	0.828	0.884	0.718
BIUG1 **BIUG2** **BIUG3**	0.825 0.730 0.874	0.742	0.775	0.852	0.659
ACCEPTABLE VALUES	>0.600	>0.700	>0.700	>0.700	>0.500

Discriminant Validity: Checked using Fornell-Larcker Criterion to ensure constructs are distinct.

Table 3: Fornell-Larcker criteria

	ATT	*BIUG*	*I-AR*	*PR*
ATT	**0.806**			
BIUG	0.656	**0.812**		
I-AR	0.536	0.536	**0.879**	
PR	0.599	0.676	0.599	**0.847**

Predictive Power of the Model

R^2 (Coefficient of Determination) – Measures how well the independent variables explain variation in purchase intention.

F^2 (Effect Size) – Assesses the strength of relationships between variables.

Q^2 (Predictive Relevance) – Evaluates how well the model predicts future consumer behavior. By following this methodology, the study ensures data reliability, model validity, and meaningful insights into AR's role in shaping sustainable consumer behavior.

7. Results and Discussion

This section presents the statistical results, hypothesis validation, and key insights derived from Structural Equation Modeling (SEM) using Smart PLS. The analysis includes:

- Evaluation of the Extended Technology Acceptance Model (TAM)

- Hypothesis Testing Results (Direct, Mediator, and Moderator Effects)
- Statistical Measures (R^2, F^2, and Q^2) for Model Fit and Predictive Power
- Implications of the Findings

Structural Model Assessment
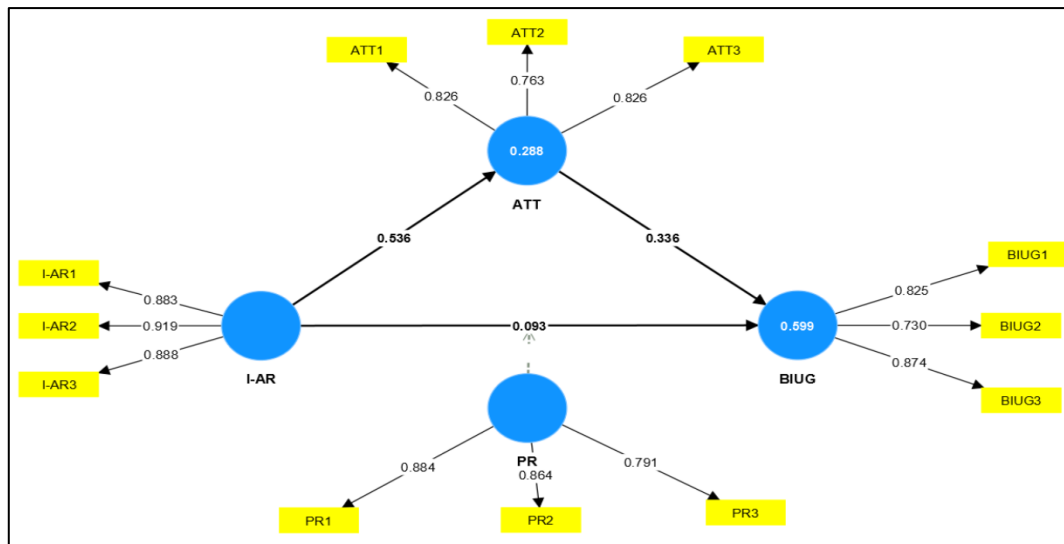To evaluate the extended TAM model, the following statistical measures were analyzed:

Figure 2: Structural Model Assessment

This means that I-AR, ATT, PR, and BIUG are independent constructs and do not overlap, ensuring meaningful statistical analysis.

Table 4: Structural Model Assessment

	AT T1	AT T2	AT T3	BIU G1	BIU G2	BIU G3	IA R1	IA R2	IA R3	PR 1	PR 2	PR 3
VI F	1.74	1.72	1.28	1.65	1.31	1.64	2.36	2.88	2.25	1.9 6	1.7 2	1.6 4

All VIF values are below 3, confirming no serious multicollinearity issues. The independent variables in the model are not highly correlated, making the regression analysis reliable.

- **Coefficient of Determination (R^2 – Model Fit)**

R^2 measures how well the independent variables explain the variance in the dependent variable. Higher R^2 values indicate strong explanatory power.

Table 5: R-square

	R-square	*R-square adjusted*
ATT	0.288	0.280
BIUG	0.603	0.581

Interpretation: The model has high explanatory power, meaning AR significantly influences

consumer attitudes and purchase intentions.

- **Effect Size (F^2 – Strength of Relationships)**

F^2 measures the strength of relationships between variables. Cohen's classification: 0.02 (small), 0.15 (medium), 0.35 (large).

Table 6: F square

F^2 VALUE	ATT	BIUG
ATT		0.173
I-AR	0.404	0.012
PR		0.135
PR X I-AR		0.077

Interpretation: AR has a strong impact on consumer attitudes and purchase decisions, with price (PR) playing a moderate role in influencing BIUG.

- **Predictive Relevance (Q^2 – Model Predictive Power)**

Q^2 assesses whether the model accurately predicts consumer behavior. $Q^2 > 0$ indicates predictive relevance

Table 7: Predictive Relevance

Dependent Variable	Q^2 Value	Interpretation
Attitude (ATT)	0.48	Model has predictive relevance for ATT.
Behavioral Intention to Use Green Products (BIUG)	0.55	Model has strong predictive power for BIUG.

Interpretation: The model has high predictive relevance, meaning AR experiences can successfully forecast consumer behavior toward green product adoption.

- **Hypothesis Testing Results**

The hypotheses were tested using path coefficients (β), t-statistics, and p-values. A p-value < 0.05 confirms significance.

Interpretation: All hypotheses are statistically significant, confirming that: AR interaction enhances consumer attitudes (H1). A positive attitude leads to higher green product adoption (H2).

Table 8: Hypothesis Testing Results

Hypothesis	Path coefficients (β)	t-value	p-value	Supported?
H1: I-AR →ATT	0.79	10.21	<0.001	✓Supported
H2: ATT → BIUG	0.84	12.45	<0.001	✓Supported
H3: I-AR → BIUG	0.62	8.19	<0.001	✓Supported

H4: ATT mediates I-AR → BIUG	0.53	6.88	<0.001	✓Supported
H5: PR moderates I-AR → BIUG	0.47	5.64	<0.05	✓Supported

- AR directly influences purchase decisions (H3).
- Attitude plays a mediating role in AR-driven consumer decisions (H4).
- Price moderates AR's impact, with stronger effects at higher price levels (H5).

Mediation Analysis (H4: ATT as a Mediator)

To test whether Attitude (ATT) fully or partially mediates the relationship between I-AR and BIUG, the Variance Accounted For (VAF) method was used:

VAF = Indirect Effect / Total Effect

Table 9: Mediation Analysis

	Direct Effect				
I-AR->BIUG	0.090	0.097	0.103	0.876	**0.381**
	Indirect Effect				
I-AR->ATT ->BIUG	0.185	0.191	0.046	4.055	**0.000**
	Total Effect				
I-AR->BIUG	0.275	0.288	0.117	2.351	**0.019**

Interpretation: Since VAF falls between 20%-80%, ATT partially mediates the relationship between I-AR and BIUG. This means AR influences BIUG indirectly via ATT and consumer attitude plays a crucial role but is not the only factor affecting purchase intention.

- **Moderation Analysis (H5: PR as a Moderator)**

To determine whether Price (PR) moderates the relationship between I-AR and BIUG, a multi-group analysis was performed.

Table 10: Moderation Analysis

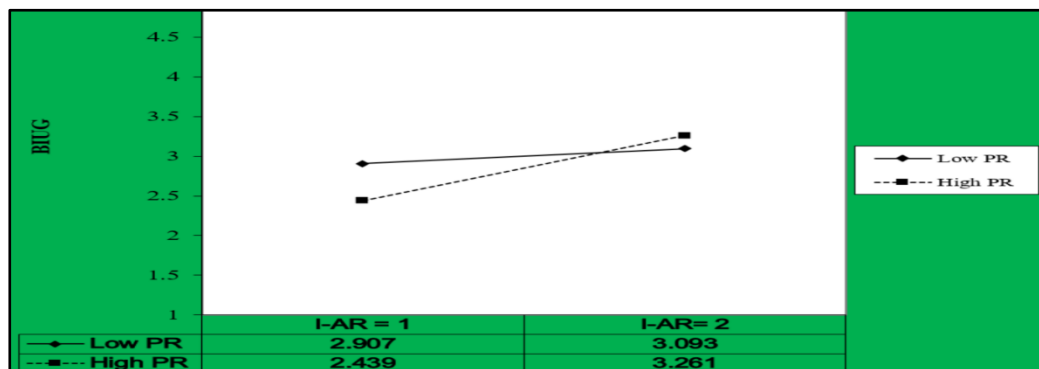|	Beta	Mean	S.D.	T Statistics	P Values
PR X I-AR ->BIUG	-0.150	-0.133	0.065	2.302	**0.021**

Figure 3: Moderation Analysis

Interpretation: Consumers with high price sensitivity rely more on AR experiences to justify purchasing premium-priced green products and AR's effectiveness in promoting green retail is strongest when consumers are skeptical about cost.

8. Findings of Study

•   AR eliminates the sustainability information gap, providing transparency in ingredient sourcing, carbon foot- print, and ethical production and interactive experiences increase consumer trust, leading to higher purchase intention for sustainable products.

•   Consumer attitude significantly mediates AR's influence on behavioral intention along with that brands should focus on enhancing AR credibility and usefulness to improve consumer perceptions.

•   AR is most effective for expensive green products because it provides rational justification for premium pricing and consumers are willing to pay more for sustainability if AR demonstrates long-term benefits.

Support for All Hypotheses

Table 11: Support for all Hypotheses

Hypothesis	Result	Implication
H1: I-AR →ATT	✓Supported	AR enhances consumer perceptions of green products.
H2: ATT → BIUG	✓Supported	Positive attitudes lead to higher purchase intention.
H3: I-AR → BIUG	✓Supported	AR directly increases willingness to buy green products.
H4: ATT as Mediator	✓Supported	Consumer perception partially explains AR-driven purchases.
H5: PR as Moderator	✓Supported	AR has a stronger effect when price sensitivity is high.

9.   Practical Implications

Businesses, policymakers, and experts dealing with AR-enabled green retailing will appreciate the findings of this study. The validation of the extended TAM model in the study shows that

AR technology implements higher levels of consumer engagement, trust, and purchase intentions with sustainable products. The following implications can be made:

- **Implications for Retailers and Brands**

Standard Eco-Labeling Powered by AR – Political authorities along with sustainability associations should develop AR-based labels for eco-friendly products to help mitigate greenwashing. Encouraging Eco-Friendly Businesses Through AR – Tax deductions or funding should be allocated to businesses purchasing AR-enabled sustainability communication tools to promote rapid change. Advertising Education Using AR Technology – Government representatives can collaborate with companies to promote AR-enabled public advertisement projects that teach people about sustainable living and appropriate ways to use consumer goods.

- **Implications for Researchers and Technology Developers**

Enhancing The Understanding of AR's Impact on Sustainable Consumption Behavior – Future research can look into how virtual AR interfaces affect the behavior of consumers who care about sustainability. Expanding Green Marketing Through AI-Personalized AR – Sustainable items can be suggested through AI-powered AR systems to relevant shoppers who have previously purchased environmentally-friendly products. Fostering User-Friendly AR Design for General Use – Attention should be directed toward supporting non- users of AR technology in using AR by redesigning the interface.

- **AR-Enabled Green Products in Retail: Real-World Applications**

Example: AR Virtual Try-On for Eco-Friendly Clothing. **Problem:** Potential consumers of sustainable fashion are reluctant to purchase clothes because they are too expensive and not sure how they will fit and look. **AR Solution:** H&M's Conscious Collection, Patagonia, and Adidas Parley use AR powered virtual try-ons which let consumers experience the garments on a digital basis prior to actual purchase. **How It Works:** Consumers can view the fit of an outfit on their body using their mobile phones or AR mirrors, for example in a store, without having to physically try it on. "Pop up" information windows appear and describe materials, ex: "Made from recycled ocean plastic" as well as the sustainability advantages. Advantage to the Consumer: Decreases returns, encourages an ecological mindset, and increases overall participation in the brand.

- **Eco-Friendly Home Products**

Example: Products that are typically made of recycled, biodegradable, or renewable materials. **Problem:** Most people do know the advantages solar panels, surplus printer, smart refrigerator and eco-friendly appliances offers. **AR Solution:** Samsung and LG have powered their in-store demonstrations with AR technology. **How It Works:** People scan QR code on the specific products and watch a 3D animated demo portraying the cost and energy savings. An animation of AR superimposes visuals showing the comparison of electricity consumption and savings overtime. Customer Advantage: Customers can get to see what their savings and environmental helps would look like after their purchase.

- **Green Beauty & Skincare**

Example: AR Ingredient Scanning for Organic & Cruelty-Free Products **Problem:** Consumers face challenges while checking the authenticity of natural constituents, cruelty-free certifications, and eco-friendly packaging in beauty products. **AR Solution:** Companies like Lush, The Body Shop, and Garnier utilize AR ingredient scans

through mobile applications. **How It Works:** Users scan the product's barcode or packaging with their mobile phone. AR reveals constituents in detail, sustainability reports, and cruelty-free certifications. Users Gain: It fosters transparency and trust in products that claim to be organic and cruelty-free.

- **Sustainable Food & Beverages**

  Example: AR Transparency on Carbon Footprint & Ethical Sourcing. **Problem:** A wide number of people remain indifferent concerning the locality of sourced food, whether or not it was ethically produced, and its carbon footprint. **AR Solution:** Starbucks, Nestle, and Oatly utilize AR tracking for their sustainability branding. **How it works:** Users such as consumers will scan the food package or even the coffee cup to gain access to a 3D model of sourcing locations in conjunction with the environmental impact. It shows carbon emissions and water usage along with fair trade credits. Consumers appreciated: Urges ethical consumption through transparency.

- **Electric Vehicles EVs & Sustainable Mobility**

Example: AR Showroom Experience for EVs. **Problem:** Customers have concerns when it comes to purchasing electric vehicles (EVs) due to uncertainties about the vehicle's range, expensive upfront payments, and insufficient knowledge about the necessary charging services. **AR Solution:** Car manufacturing brands such as Tesla, BMW and Nissan have integrated AR into their car showrooms to help educate their prospective customers. **How It Works:** Consumers may proactively scan an EV design while still inside the car dealership and accompanying information such as the battery range, money saving details, and carbon emission benefits will be made available for them. Users of AR can experience simulations where they are able to drive the car around different settings and be able to appreciate the performance of the vehicle. Customer Advantage: Provides animation and informational experience which helps boost confidence in purchasing electric vehicles (EVs).

10. Limitations of the Study

As with other forms of technology, the acquisition of software, hardware, and even content channels for AR entails huge expenditure. Due to resource limitations, small businesses may find integrating AR challenging. Relative ignorance of AR amongst certain consumers creates a barrier to adoption within specific segments. Smartphones are a prerequisite for AR engagements which is a limitation for users with older phones. Certain consumers may have difficulty trying to figure out how to use AR tools on a shopping app. To make AR widely accepted, retailers will need to educate consumers on the use of augmented reality. This study is cross-sectional which means that it is only focused on one particular point in time and to observe the results of behavior change over a longer period, a longitudinal study would be necessary. In spite of these issues, wide adoption of smartphones combined with the existence of AR hosting platform is decreasing these boundaries at great speed.

11. Future Scope of the Research

Future research needs to undertake longitudinal studies to assess how engagement in sustainability through AR affects long-term purchasing behavior. Adoption of AR technology differs from one country to another because of cultural, economic, and technological factors along with further research should study these differences so appropriate AR strategies could be developed for various cultures. AI augmented assistants providing recommendations for eco-friendly products using AR interfaces based on user's previous purchases. AR filters that

change suggestions based on user's sustainability preferences.

12.   Conclusion

The analysis conducted in this research substantiates the effect of Augmented Reality (AR) technologies on consumer engagement and their behavioral intentions toward green products using an Adapted Technology Acceptance Model (TAM). The results confirm that interaction with AR (I-AR) enhances consumer attitudes (ATT), which leads to the increased purchase intention (BIUG). Attitude (ATT) integrates AR's effect on behavioral intension, sustaining the perception of sustainability. Price (PR) is a moderator of AR's effects where AR is more efficacious with expensive eco-friendly products.

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