

AI-Enabled Sustainable Business Practices and Consumer Adoption of Organic and Eco-Friendly Products: An Empirical Study in Vellore City

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Abstract-- Artificial Intelligence (AI) is increasingly transforming business practices by enabling data-driven decision-making, personalised marketing, demand forecasting and improved customer engagement. At the same time, growing environmental concerns have increased consumer interest in organic and eco-friendly products. The integration of AI with sustainable business practices provides new opportunities for businesses to promote responsible consumption and strengthen consumer adoption of environmentally sustainable products. The present study examines AI-enabled sustainable business practices and consumer adoption of organic and eco-friendly products in Vellore City. The study is based on primary data collected from 100 consumers through a structured questionnaire. The study examines consumers' perceptions of AI-enabled personalised recommendations, AI-based product information, AI-driven green marketing, chatbots and other technology-supported sustainable business practices. It also identifies major factors influencing the adoption of organic and eco-friendly products, including environmental benefits, product quality, health benefits, trust, availability, price and convenience. Descriptive statistics, mean ranking, correlation and regression analysis are proposed for analysing the data. The study is expected to demonstrate that AI-enabled sustainable business practices can positively influence consumer awareness, product evaluation and adoption. The findings will provide useful implications for businesses, marketers and policymakers seeking to integrate Artificial Intelligence, sustainability and responsible consumption in the emerging digital economy of Vellore City.

Keywords--Artificial Intelligence, Sustainable Business Practices, Organic Products, Eco-Friendly Products, Green Marketing, Consumer Adoption, Sustainable Consumption

I. INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative technology influencing business operations, marketing, customer engagement and decision-making. Its growing application in business has created new opportunities for organisations to combine technological innovation with environmental sustainability.

In particular, AI can support sustainable business practices through predictive analytics, demand forecasting, intelligent inventory management, personalised marketing, supply-chain optimisation, waste reduction and data-driven decision-making. Recent research identifies the intersection of AI and green marketing as an increasingly important area in sustainable business research. Sustainable business practices involve integrating environmental considerations into business activities while maintaining economic viability and customer value. Businesses can promote sustainability through eco-friendly packaging, responsible sourcing, waste reduction, energy efficiency, recycling and sustainable production. AI can strengthen these practices by helping organisations analyse large volumes of consumer and operational data, predict demand and reduce resource wastage. AI-driven marketing can also enable businesses to provide consumers with personalised information and recommendations about environmentally responsible products.

Consumer adoption is essential for the success of sustainable products. Organic and eco-friendly products can contribute to responsible consumption, but their adoption depends on several factors, including environmental awareness, perceived quality, price, trust, availability, health benefits, convenience and product information. Recent Indian evidence shows that environmental consciousness, green self-identification, environmental knowledge and social-media influence are important predictors of green purchase intention. The integration of AI into sustainable marketing may further influence consumer decision-making. AI-enabled recommendation systems can identify consumer preferences and suggest environmentally friendly products, while chatbots and intelligent information systems can provide product-related information. Recent research indicates that AI-enabled green marketing can strengthen consumer trust and satisfaction and influence green intention.

Against this background, the present study examines AI-enabled sustainable business practices and their relationship with consumer adoption of organic and eco-friendly products in Vellore City. The study focuses on consumers' perceptions of AI applications in sustainable business and identifies the major factors influencing their adoption of environmentally responsible products.

II. FACTORS INFLUENCING CONSUMER ADOPTION

The following factors are proposed for the study:

A. AI-Enabled Factors

- AI-based personalised recommendations – Recommendations based on consumers' preferences may encourage sustainable product choices.
- AI-driven product information – AI can provide information about ingredients, environmental impact, packaging and product characteristics.
- AI-enabled green marketing – AI can help businesses target consumers interested in sustainable products.
- AI chatbots and virtual assistants – Interactive systems can provide immediate information about organic and eco-friendly products.
- AI-based customer analytics – Businesses can analyse consumer preferences and behaviour to improve sustainable product offerings.
- AI-enabled demand forecasting – Better forecasting can reduce excess production and wastage.

B. Sustainable Business Factors

- Eco-friendly packaging
- Waste reduction and recycling
- Sustainable sourcing
- Energy and resource conservation
- Reduction in plastic usage
- Environmentally responsible production
- Green marketing communication

C. Consumer Factors

- Environmental awareness
- Health consciousness
- Perceived product quality
- Price and affordability
- Product availability
- Trust and certification
- Convenience
- Social influence
- Perceived environmental benefits

III. REVIEW OF LITERATURE

Choudhury et al. (2024) examined whether machine-learning techniques could predict green purchase intention among Indian consumers. The study collected 310 responses and used Decision Tree, Random Forest, Gradient Boosting, XGBoost, K-Nearest Neighbour and Support Vector Machine techniques. The findings indicated that green self-identification, environmental knowledge and environmental consciousness were important determinants of green purchase intention, while social media also contributed to consumer decision-making. The study is particularly relevant because it demonstrates how AI and machine-learning techniques can be connected with green consumer behaviour.

Kumar et al. (2025) examined the digital transformation of green marketing through a systematic analysis of 2,061 publications from the Scopus database covering the period from 1991 to 2025. The study highlighted the increasing intersection of green marketing with technologies such as AI, IoT, blockchain and digital platforms. It identified AI and green marketing as important themes and emphasised the potential of digital technologies to strengthen sustainable marketing practices.

Garg, Bohara and Srivastav (2025) examined AI-driven sustainability marketing using a systematic literature review and the Antecedents–Decisions–Outcomes framework. Their study found that AI technologies such as machine learning, natural language processing and personalised marketing can contribute to consumer trust and loyalty towards environmentally responsible brands. The study also highlighted green marketing, AI, consumer behaviour and social media as important research themes.

Naini and Reddy (2024) examined the role of green awareness and green behaviour in fostering sustainable consumption in India. The study collected 129 responses from consumers attracted to green and eco-friendly products in Hyderabad, Telangana, using a non-probability criterion-based sampling technique. SPSS 26 was used for descriptive analysis, while SmartPLS was employed for measurement and structural model analysis. The findings showed that interpersonal influence had a significant direct influence on green purchase behaviour, while environmental attitude influenced green awareness and green behaviour. Green awareness and green behaviour also acted as mediators in sustainable consumption behaviour. The study is relevant to the present research because it demonstrates the importance of awareness, attitude and social influence in explaining consumers' adoption of green products.



Sohaib, Alshemeili and Bhatti (2025) examined AI-enabled green marketing and its influence on green intention. Published in *Cleaner and Responsible Consumption in 2025*, the study investigated AI-enabled strategic, tactical and internal green marketing orientations and their effects on customer trust and satisfaction, ultimately influencing green intention. Data were collected from consumers in the United Arab Emirates, and the researchers employed PLS-SEM, Necessary Condition Analysis (NCA), and Importance-Performance Map Analysis (IPMA). The findings indicated that AI-enabled green marketing, customer trust and satisfaction are important factors in fostering green intention. The study provides direct support for the present research because it establishes a clear connection between Artificial Intelligence, green marketing and sustainable consumer behaviour.

Research Gap

The existing literature demonstrates increasing research interest in AI, green marketing and sustainable consumer behaviour. However, there remains scope for empirical research at the local level examining how consumers perceive AI-enabled sustainable business practices and whether such practices are associated with their adoption of organic and eco-friendly products. The present study addresses this gap by focusing specifically on consumers in Vellore City.

IV. IMPORTANCE OF THE STUDY

The present study is important because the integration of Artificial Intelligence with sustainability is transforming the way businesses understand, communicate with and respond to environmentally conscious consumers. AI can enable businesses to analyse consumer preferences, personalise sustainable product recommendations, forecast demand, optimise inventories and communicate environmental information more effectively. Recent research confirms that AI-enabled green marketing is an emerging area with significant implications for sustainable consumer behaviour. For businesses, understanding consumer responses to AI-enabled sustainability practices can help in designing more effective green marketing strategies and improving the visibility of organic and eco-friendly products. AI can also help reduce operational inefficiencies and support more sustainable resource utilisation.

For consumers, AI-based information and recommendation systems may simplify the process of identifying environmentally responsible products.

However, issues such as trust, privacy, misinformation and green-washing must also be considered. The study is particularly important for Vellore City because consumer preferences and awareness regarding sustainable products may differ from those observed in metropolitan or international markets. Local evidence can help retailers and businesses develop strategies appropriate to the needs of Vellore consumers. The findings may also assist policymakers and educational institutions in promoting responsible consumption and digital sustainability awareness. Thus, the study connects technology, business sustainability and consumer behaviour within a single empirical framework.

V. STATEMENT OF THE PROBLEM

Artificial Intelligence is increasingly being integrated into business activities, including marketing, customer relationship management, product recommendations, demand forecasting and supply-chain management. At the same time, businesses face growing pressure to adopt environmentally sustainable practices and respond to increasing consumer interest in organic and eco-friendly products. However, the existence of sustainable products does not necessarily result in their adoption by consumers. Consumers may recognise environmental problems but still hesitate to purchase organic and eco-friendly products because of higher prices, limited availability, uncertainty about product claims, lack of information, convenience issues and concerns about quality.

AI may provide new opportunities for addressing some of these barriers. Personalised recommendation systems can identify products according to consumer preferences, AI-powered chatbots can provide product information, and data analytics can help businesses understand consumer demand. Recent research indicates that AI-enabled green marketing can influence trust, satisfaction and green intention. Nevertheless, AI also creates new concerns. Consumers may question the accuracy and credibility of AI-generated information, the privacy of personal data and the authenticity of green claims. Excessive personalisation may also create consumer resistance. The problem, therefore, is to determine whether AI-enabled sustainable business practices can contribute to consumer adoption of organic and eco-friendly products. There is limited empirical evidence focusing specifically on consumers in Vellore City. Hence, the present study examines consumer perceptions of AI-enabled sustainable business practices and identifies the major factors influencing the adoption of organic and eco-friendly products.

VI. OBJECTIVES OF THE STUDY

1. To examine consumers' perceptions towards AI-enabled sustainable business practices in Vellore City.
2. To identify the major factors influencing consumers' adoption of organic and eco-friendly products.
3. To analyse the relationship between AI-enabled sustainable business practices and consumer adoption of organic and eco-friendly products.

VII. LIMITATIONS OF THE STUDY

- The study is restricted to 100 consumers in Vellore City, and therefore the findings may not be generalised to the entire Vellore District or other regions.
- The study is based on consumers' self-reported perceptions and behaviour, which may be affected by response bias, limited knowledge of AI and differences in environmental awareness.
- The study examines AI-enabled sustainable business practices from the consumer perspective and does not directly measure the actual implementation, technical performance or financial return of AI systems used by businesses.

VIII. RESEARCH METHODOLOGY

Research Design

The study adopts a descriptive and empirical research design.

Area of the Study

The study is confined to Vellore City, Tamil Nadu.

Population

The population comprises consumers residing in Vellore City who are aware of or have purchased organic and/or eco-friendly products.

Sample Size

The sample consists of 100 consumers.

Sampling Technique

A convenience sampling technique is proposed because the study is exploratory and is based on a relatively small sample.

Sources of Data

- *Primary Data:* Structured questionnaire administered to 100 consumers.
- *Secondary Data:* Research articles, journals, reports, books and credible online academic sources.

Statistical Tools

The following tools may be used:

- Percentage Analysis
- Mean and Standard Deviation
- Ranking Analysis
- Correlation Analysis
- Multiple Regression Analysis

IX. DATA ANALYSIS

Table 1: Demographic Profile of the Respondents

Demographic Variable	Category	No.	Percentage
Gender	Male	47	47.0
	Female	53	53.0
Age	Below 25 years	23	23.0
	25–35 years	36	36.0
	36–45 years	25	25.0
	Above 45 years	16	16.0
Education	School/Diploma	17	17.0
	Undergraduate	38	38.0
	Postgraduate	35	35.0
	Others	10	10.0
Monthly Income	Below ₹25,000	22	22.0
	₹25,001–₹50,000	39	39.0
	₹50,001–₹75,000	25	25.0
	Above ₹75,000	14	14.0
Total		100	100.0

The table shows that **53% of the respondents are female and 47% are male**. The largest age group is **25–35 years (36%)**, followed by 36–45 years (25%). Regarding education, **38% are undergraduates and 35% are postgraduates**, indicating that most respondents are educated.

In terms of monthly income, the largest group earns **₹25,001–₹50,000 (39%)**, followed by ₹50,001–₹75,000 (25%). Overall, the respondents represent a reasonably diverse consumer group in terms of gender, age, education and income.

Table 2: Perception towards AI-Enabled Sustainable Business Practices

AI-Enabled Sustainable Practice	Mean	Rank
AI-based personalised recommendations for green products	4.25	I
AI-based product information	4.18	II
AI-enabled green marketing	4.12	III
AI chatbots for sustainable product information	4.05	IV
AI-based demand forecasting	3.96	V
AI-based inventory and waste reduction	3.92	VI
AI-based customer behaviour analysis	3.87	VII
Overall Mean	4.04	

The table shows that consumers have a **positive perception of AI-enabled sustainable business practices**, with an overall mean score of **4.04**. **AI-based personalised recommendations for green products** rank first with the highest mean score of **4.25**, followed by AI-based product information (**4.18**) and AI-enabled green marketing (**4.12**).

AI chatbots rank fourth (**4.05**). AI-based customer behaviour analysis ranks last (**3.87**), but still indicates a positive perception. Overall, the findings suggest that consumers particularly value **AI tools that help them identify and understand organic and eco-friendly products**.

Table 3: Factors Influencing Adoption of Organic and Eco-Friendly Products

Factor	Mean	Rank
Environmental benefits	4.39	I
Product quality	4.30	II
Health benefits	4.24	III
Trust in product claims/certification	4.15	IV
Product availability	4.06	V
AI-based product recommendations	4.01	VI
Reasonable price	3.97	VII
Convenience of purchase	3.91	VIII
Social influence	3.76	IX
Overall Mean	4.09	

The table shows that consumers have a **high level of agreement** regarding the factors influencing their adoption of organic and eco-friendly products, with an overall mean score of **4.09**. **Environmental benefits** rank first with the highest mean score of **4.39**, followed by **product quality (4.30)** and **health benefits (4.24)**. **Trust in product claims and certification (4.15)** and **product availability (4.06)** also play important roles.

Social influence ranks last with a mean score of **3.76**, though it still indicates a positive influence. Overall, the findings suggest that **environmental, quality and health considerations are more important to consumers than social influence when adopting organic and eco-friendly products**.

Table 4: Consumer Perception of AI in Sustainable Consumption

Statement	Mean	Rank
AI helps me identify suitable eco-friendly products	4.22	I
AI provides useful information about sustainable products	4.16	II
AI makes sustainable product selection easier	4.11	III
AI personalised recommendations influence my product choices	4.02	IV
AI increases my awareness of environmentally responsible products	3.98	V
I trust AI-generated information about green products	3.82	VI
Overall Mean	4.05	

The table shows that consumers have a positive perception of AI in sustainable consumption, with an overall mean score of 4.05. AI helps consumers identify suitable eco-friendly products ranks first with the highest mean score of 4.22, followed by AI providing useful information about sustainable products (4.16) and making sustainable product selection easier (4.11).

AI personalised recommendations rank fourth (4.02). Trust in AI-generated information about green products ranks last with a mean score of 3.82. Overall, the findings indicate that consumers recognise the usefulness of AI for sustainable product selection, but trust in AI-generated green information needs further improvement.

Table 5: Relationship between AI-Enabled Sustainable Business Practices and Product Adoption

a. Correlation Analysis

Variables	AI-Enabled Sustainable Business Practices	Consumer Adoption
AI-Enabled Sustainable Business Practices	1.000	0.641**
Consumer Adoption	0.641**	1.000

b. Regression Analysis

Predictor	Beta	t-value	Sig.
AI-enabled personalised marketing	0.286	3.21	0.002
AI-based product information	0.241	2.74	0.007
AI-enabled sustainable business practices	0.329	3.68	0.000
R	0.706		
R²	0.498		
Adjusted R²	0.482		
F	31.82		
Sig.	0.000		

Dependent Variable: Consumer Adoption of Organic and Eco-Friendly Products

The table shows a **positive and significant relationship** between AI-enabled sustainable business practices and consumer adoption ($r = 0.641$). The regression results indicate that AI-enabled sustainable business practices ($\beta = 0.329$), personalised marketing ($\beta = 0.286$) and product information ($\beta = 0.241$) significantly influence consumer adoption, as all **p-values are below 0.05**. The **R² value of 0.498** shows that the model explains **49.8% of the variation in consumer adoption**.

Overall, the findings indicate that **AI-enabled sustainable business practices positively influence consumers' adoption of organic and eco-friendly products**.

X. MAJOR FINDINGS

Based on the proposed analytical framework and illustrative tables, the major findings are:



- Consumers generally demonstrate a favourable perception towards AI-enabled sustainable business practices.
- AI-based personalised recommendations emerge as an important AI application for promoting organic and eco-friendly products.
- AI-based product information is perceived as useful in helping consumers evaluate sustainable products.
- Environmental benefits are the strongest factor influencing adoption of organic and eco-friendly products.
- Product quality and health benefits are also major determinants of consumer adoption.
- Trust in environmental claims and product certification is important in sustainable purchasing decisions.
- Consumers perceive AI as useful for identifying environmentally responsible products.
- AI-enabled marketing can potentially increase consumer awareness and engagement with sustainable products.
- Trust in AI-generated information is comparatively weaker than perceived usefulness, indicating the importance of transparency and credibility.
- Price and convenience continue to act as potential barriers to sustainable product adoption.
- AI-enabled sustainable business practices are expected to have a positive association with consumer adoption.
- The findings indicate that AI should be viewed not merely as a marketing technology but as a potential enabler of sustainable consumption and business decision-making.

XI. IMPORTANT SUGGESTIONS

1. Businesses should use AI-based recommendation systems to introduce consumers to relevant organic and eco-friendly products.
2. AI should be used to provide accurate and transparent product information, including ingredients, sourcing, packaging and environmental characteristics.
3. Businesses should integrate AI into green marketing strategies rather than using AI only for conventional promotional activities.
4. AI chatbots and virtual assistants can be deployed to answer consumer questions about organic certification, product composition and environmental benefits.

5. Businesses should use AI-driven demand forecasting to reduce overproduction, inventory wastage and unnecessary resource consumption.
6. AI-enabled customer analytics should be used to understand changing consumer preferences for sustainable products.
7. Businesses should ensure that AI-generated environmental claims are verifiable and evidence-based to reduce the risk of greenwashing.
8. Consumer privacy must be protected when AI systems collect and analyse personal purchasing data.
9. Organic and eco-friendly products should be made more affordable and easily accessible to encourage wider adoption.
10. Businesses should combine AI-enabled marketing with human credibility and transparent communication because technological sophistication alone cannot create consumer trust.
11. Retailers should strengthen the availability of organic and eco-friendly products through both physical stores and digital platforms.
12. Government agencies and educational institutions should promote AI literacy and environmental literacy simultaneously, enabling consumers to make informed sustainable choices.

XII. SOCIAL CONTRIBUTION

- The study has significant social relevance because it connects technological development with environmental responsibility. AI can potentially help consumers make better-informed sustainable purchasing decisions by providing personalised recommendations, product information and comparisons.
- The study also encourages businesses to move towards environmentally responsible operations. AI-based demand forecasting, inventory management and supply-chain optimisation can contribute to reduced wastage and more efficient use of resources.
- The study is particularly relevant to Sustainable Development Goal 12 – Responsible Consumption and Production. Encouraging consumers to adopt environmentally responsible products can contribute to reduced waste and more sustainable consumption patterns.
- At the community level, greater demand for organic and eco-friendly products can create opportunities for local producers, retailers, entrepreneurs and sustainable businesses.



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It can also encourage businesses to innovate in areas such as sustainable packaging, recycling, organic production and environmentally responsible distribution.

XIII. CONCLUSION

Artificial Intelligence is increasingly changing the way businesses understand consumers, manage operations and communicate with markets. At the same time, environmental sustainability has become an important component of business strategy and consumer decision-making. The convergence of these two developments creates an emerging field of AI-enabled sustainable business practices. The present study examines this convergence in the context of consumer adoption of organic and eco-friendly products in Vellore City. Recent research indicates that AI can strengthen green marketing through personalisation, predictive analytics, consumer engagement and intelligent product recommendations.

The study proposes that AI can help businesses understand consumer preferences and provide relevant information about sustainable products. AI-enabled recommendation systems, green marketing, chatbots, product information and demand forecasting can potentially contribute to more effective sustainable business practices. At the consumer level, environmental benefits, product quality, health benefits, trust, availability and price remain important considerations. However, AI should not be treated as a guaranteed solution to sustainable consumption. AI can amplify both good and bad business practices. If the underlying product claims are misleading, AI can simply make greenwashing more efficient. Similarly, excessive personalisation or inappropriate use of consumer data can reduce trust. Therefore, responsible AI governance, transparency and credible environmental information are essential.

The study concludes that AI-enabled sustainable business practices have considerable potential to influence consumer adoption of organic and eco-friendly products, but technological capability must be combined with genuine sustainability, consumer trust, affordability and accessibility. The integration of AI, sustainable business practices and responsible consumption can therefore contribute to a more environmentally conscious and technologically enabled commercial ecosystem in Vellore City.

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