



# “Generative AI-Driven Personalization and Sustainable Consumer Behaviour Among Millennials in Fashion E-Commerce”

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**Abstract:** AI-driven personalization has emerged as the major determinant for improving the customer shopping experiences in e-commerce by providing them with customized needs and supporting sustainable purchases. This study analyses the impact of Generative AI-driven personalization on sustainable consumer behaviour among e-commerce users. Quantitative research design was adopted for the study. The data was collected from 100 respondents using e-commerce platforms from a structured questionnaire. Correlation and regression analysis were used for the study. The findings revealed that Personalized recommendations encourage consumers to make increased sustainable purchase decisions. Therefore, the study provides insights into the implications of integrating personalization with sustainability initiatives in e-commerce platforms.

**Keywords:** AI-driven personalization, Sustainable consumer behaviour, E-commerce, Artificial intelligence, Consumer behaviour.

## INTRODUCTION

The immediate advancement in the e-commerce platform has shifted the fashion retail industry by providing consumers with greater convenience, variety in products, and personalized shopping experiences. Among the technological advancements driving this transformation, Generative Artificial Intelligence (Generative AI) has emerged as a powerful tool capable of delivering highly personalized recommendations, customized product suggestions, virtual styling assistance, and interactive customer support. Generative AI examines the preferences of the consumers, browsing history, and purchasing patterns to create a customized shopping experiences enhancing customer satisfaction and engagement with the respective platform.

Millennials are the most influential consumer segment in the online market, as their technology use is higher than that of other generations and they are naturally technology-driven, with an urge to make new attempts. Simultaneously, millennials are increasingly conscious of environment and social issues, leading to preference for sustainable products and responsible consumption. This kind of transformation has encouraged e-commerce platforms in fashion industry to integrate the sustainability with advanced AI-driven personalization practices to impact positive consumer behaviour.

Generative AI-driven personalization has the capacity to improve the sustainable consumer behaviour by suggesting eco-friendly products, reducing over information, and product returns and by appreciating purchasing decisions that supports well with the customers' value. Relevant sustainable alternatives are delivered based on the individual preferences made by the consumers, AI can help build the support between consumers' sustainability intentions and their actual purchasing behaviour. As a result, integrating these Generative AI-driven personalization into fashion e-commerce industry enhances experiences of the customers and also assists to sustainable retail practices.

In spite of the developing adoption of Generative AI in online retailing, study examining its impact on sustainable consumer behaviour, focusing on millennials in the fashion e-commerce remains scarce. Addressing this gap, the current study explores the influence of Generative AI-driven personalization on sustainable consumer behaviour among millennials in fashion e-commerce platform. The results are expected to provide valuable insights for e-commerce fashion platforms aiming to enhance personalized and eco-friendly responsible strategies in the market.

## I. LITERATURE REVIEW

### Generative AI and AI-Driven Personalization

Zhang and Liu (2026) conducted a study on AI-driven Consumer Research in the fashion sector. The study identified AI-powered chatbots, recommendation systems, and personalized technologies as major factors affecting consumer engagement and shopping experiences. Ahmed et al. (2025) analysed the integration of Generative AI in the fashion industry and found that design of the product, personalization, customer experience, and decision-making in the retail sector is enhanced by AI. Madanchian (2024) concluded that Generative AI makes consumers better understand their preferences and deliver personalized suggestions by improving customer engagement and decision-making in the e-commerce platform.

### Sustainable Consumer Behaviour

Hong et al. (2024) identified that sustainable consumption practices are influenced by environmental values, attitudes, and personal norms. It is found that consumers with environmental care are likely to engage in purchasing sustainable fashion products and have responsible consumption behaviour. Schiaroli et al. (2024) reviewed hindrances to sustainable fashion

consumption such as high prices, lack of knowledge among consumers and limited availability. Cosma (2024) found that altruistic values, subjective norms, and positive attitudes affect intentions' of consumers to purchase sustainable apparel. Therefore, it is revealed that environmental knowledge acts as a major determinant in promoting sustainable consumer behaviour and by reducing overusage.

#### Millennials and Sustainable Fashion Consumption

Madinga et al. (2024) identified that price sensitivity and fashion consciousness act as hindrances to sustainable consumption behaviour. Though millennials show willingness towards sustainability, economic considerations are considered a distress. Masserini et al. (2024) compared the study between Generation Z and Millennials and found both generations have environmental concerns, influencing fashion purchase decisions by seeking sustainable alternatives. Mukthar et al. (2024) revealed that consumers recognise the benefits of the environment of recycled apparel, by conducting awareness campaigns and thereby enhancing the eco-friendly behaviour of the consumers in the fashion sector.

## II. RESEARCH GAP

Existing studies have widely explored millennials' attitudes and satisfaction on the purchase intention through e-commerce rather than sustainable consumer behaviour. Fewer studies have integrated Generative AI personalization and sustainability; that too, limited research has focused on millennials. But the study lacks enough information on Generative AI-driven personalization on sustainable buying behaviour among millennials in the fashion industry. Furthermore, the study has insufficient evidence of this research in Indian fashion markets, creating a need for this empirical examination.

## III. OBJECTIVES OF THE STUDY

- 1.To examine the relationship between AI-driven personalization and sustainable consumer behaviour among millennials.
- 2.To analyse the impact of AI-driven personalization on sustainable consumer behaviour among millennials.

## IV. HYPOTHESIS

H0: Generative AI-driven personalization has no significant impact on sustainable consumer behaviour among millennials.

H1: Generative AI-driven personalization has a significant impact on sustainable consumer behaviour among millennials.

## V. CONCEPTUAL FRAMEWORK

Generative AI-driven Personalization  $\longrightarrow$  Sustainable Consumer behaviour

## VI. RESEARCH METHODOLOGY

A quantitative research approach is adopted for the study using a descriptive and analytical research design. The research aims to analyse the effect of generative AI-driven personalization on sustainable consumer behaviour in fashion e-commerce among millennials. Generative AI-driven Personalization was measured using items related to Personalized recommendations, Personalized Advertisements, AI-powered chatbots, Customized offers, and Personalized shopping experiences, whereas Sustainable Consumer behaviour was measured using Sustainable fashion preference, Environmentally Conscious purchasing, Support for ethical brands, Responsible consumption, and Clothing reuse. Millennials are the target audience for the research study who make purchases of fashion products on e-commerce platforms and are well experienced with the usage of personalized recommendations and AI-enabled features of shopping through apps. The convenience sampling technique is used for collecting data from respondents in the age category of 28 to 43 years, suitable for an easy-to-access target audience. A sample size of 100 millennial respondents is employed for the study. The research utilized both primary and secondary data, wherein Primary data is collected through a structured questionnaire from millennials who are actively engaged in online fashion shopping, and secondary data is obtained from books, journals, and articles. The questionnaire is measured using a five-point Likert scale. The collected data is analysed using statistical software such as SPSS. The research employed Descriptive statistics, Cronbach's Alpha for reliability testing, Pearson Correlation, and Simple Linear Regression statistical tests.

## RESEARCH FINDINGS AND DISCUSSIONS

The demographic factors for the study include Age, gender, Educational Qualification, Occupation, Monthly family income of the respondents, Preferred fashion e-commerce platform, and Frequency of usage of online fashion purchases made by the respondents. Simple percentage analysis is used to analyse the demographic data.

TABLE 1: DEMOGRAPHIC PROFILE OF THE RESPONDENTS

DEMOGRAPHIC	CATEGORIES	PERCENTAGE
AGE	27 – 30 years	35.0
	<b>31 - 35 years</b>	<b>38.0</b>
	36 - 40 years	17.0
	41 - 45 years	10.0
GENDER	Male	46.0
	<b>Female</b>	<b>54.0</b>
EDUCATIONAL QUALIFICATION	<b>Graduate</b>	<b>47.0</b>
	Post graduate	32.0
	Doctorate	9.0
	Others	12.0
MONTHLY FAMILY INCOME	Less than 25,000	6.0
	<b>25,001 – 50,000</b>	<b>53.0</b>
	50,001 – 75,000	29.0

	More than 75,000	12.0
FREQUENCY OF PURCHASE OF FASHION PRODUCTS ONLINE	Weekly	6.0
	<b>Monthly</b>	<b>39.0</b>
	Occasionally	38.0
	Rarely	17.0
PREFERRED E-COMMERCE PLATFORM	Myntra	14.0
	Ajio	26.0
	<b>Amazon</b>	<b>35.0</b>
	Flipkart	25.0

In reference to Table 1, the data indicate that the majority of the respondents fall in the age group of 31 – 35 years. Accordingly, 47% respondents are currently pursuing a graduate. The majority of the respondents are female, with 54%. The majority of the respondents’ monthly family income is between 25,000 and 50,000. The respondents make monthly purchases of products through e-commerce, and the preferred e-commerce platform by the respondents are Amazon.

TABLE 2: RELIABILITY TEST

The value of Cronbach’s alpha for Generative AI-driven Personalization is 0.932.

Cronbach’s alpha	No. of Statements
0.932	15

The value of Cronbach’s alpha for Sustainable consumer behaviour is 0.934.

Cronbach’s alpha	No. of Statements
0.934	15

TABLE 3: CORRELATION ANALYSIS

Correlation between Generative AI-driven Personalization and Sustainable Consumer behaviour

Factors	“r value”
Generative AI-driven Personalization and Sustainable Consumer behaviour	0.813**

Source: primary data

Note: \*\* denote significance at 0.01 level (2-tailed)

The Pearson correlation analysis revealed a strong and statistically significant positive relationship between Generative AI-driven personalization and Sustainable consumer behaviour ( $r=0.813$ ,  $p<0.001$ ,  $n=100$ ). Since the p-value is less than the 0.01 significance level, the relationship is statistically significant. Hence, the null hypothesis is rejected, confirming AI-driven personalization has a significant positive association with Sustainable consumer behaviour.

TABLE 4: REGRESSION ANALYSIS

Cause and Effect Relationship between Generative AI-driven Personalization and Sustainable Consumer Behaviour

**COEFFICIENTS**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std.Error	Beta		
(CONSTANT)	.626	.208		3.011	.003
Generative AI-driven Personalization	.799	.058	.813	13.834	.000**
R <sup>2</sup> value	.661				
F value	191.375				
P value	.000				

Dependent variable: Sustainable Consumer behaviour

Note: \*\*denotes significant at 1% level

\*denotes significant at 5% level

From the above table, it can inferred that the multiple correlation co-efficient (Multiple R) of 0.813 measuring the nature of relationship between the Generative AI-driven personalization and Sustainable consumer behaviour is strongly positive.

The R<sup>2</sup> value of 0.661 indicates that about 66.1% of the variance in Sustainable consumer behaviour is explained by the Generative AI-driven personalization.

The Regression equation is Y, Sustainable consumer behaviour = .799 (AI-driven personalization), .626 (Constant).

It can inferred that, Generative AI-driven personalization had a significant positive impact on Sustainable consumer behaviour at 1% level of significance since  $p<0.01$ . This results in acceptance of the hypothesis.

## FINDINGS AND SUGGESTIONS

The study illustrated that Generative AI-driven personalization and sustainable consumer behaviour measurement scales are highly reliable, as the Cronbach's alpha value exceeds the threshold of 0.90, with excellent reliability. Generative AI-driven personalization and Sustainable consumer behaviour revealed a strong positive relationship in correlation analysis. Regression results accounted for 66.1% of the variance in the dependent variable. The findings indicated that personalized AI-enabled recommendations are crucial for making sustainable purchase decisions on e-commerce platform. The results revealed that personalized shopping experiences are valued when sustainability is given preference by focusing responsible consumption.

Therefore, these findings suggest that e-commerce platform should concentrate on improving AI-powered personalization by incorporating sustainability characteristic into recommendation systems, thereby providing transparency in sustainable products. However, the use of AI technologies in e-commerce platforms by retailers should be at the risk of e-commerce platforms by involving the actions of ethical fashion practices, enhancing consumer awareness, and designing customized reward strategies that encourage eco-friendly purchasing behaviour.

## CONCLUSION

The current study has analysed the impact of Generative AI-driven personalization on sustainable consumer behaviour among millennials in the e-commerce sector. The results revealed a positive significant relationship exists between AI-driven personalization and sustainable consumer behaviour, demonstrating positive influence of customized recommendations towards preference of the customers in making eco-friendly purchasing decisions. The growing significance of artificial intelligence is highlighted in this study by experiencing personalized shopping practices by enhancing the communication relationship among customers and also encouraging sustainable consumption practices. Therefore, valuable insights are provided from the study to integrate AI-enabled technologies along with sustainability practices that help in responsible consumption in e-commerce platforms.

## LIMITATIONS AND SCOPE FOR FUTURE STUDIES

The present study has certain limitations. Firstly, the study collected responses from only 100 e-commerce users, limiting the results to a broader population. Second, the study emphasized only AI-driven personalization on sustainable consumer behaviour, leaving out other important factors such as customer satisfaction, trust, loyalty, and purchase intention. Third, the data was collected at a single time by not capturing the changes in consumer behaviour that occur over time. Finally, the study focused only on the purchasing decisions of the consumers in e-commerce platforms and not on other retail settings or product varieties. These limitations furnish opportunities for further study to widen the scope and improve the understanding of AI-driven personalization and sustainable consumer behaviour.

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