



The Role of Artificial Intelligence in Fashion Design: Gen Z Perspectives for a Sustainable Future

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Abstract

In this age of technology, artificial intelligence (AI) has a tremendous impact on fashion. It is reshaping the industry through predictive analytics to forecast market trends, computerization of the design processes, and custom-made shopping experiences. AI-enabled tools analyze customer preferences and allow brands to design more targeted groups and reduce waste, promoting sustainability. With the wide literature review, the researcher found a research gap that needs to be more absorbed in Gen Z perspectives and a need for more integration between AI and sustainability in fashion design. A structured questionnaire was designed to pool the data. The statistics used are ANOVA, Friedman ranking, and correlation. The analysis revealed that there is a significant relationship between familiarity with the role of AI in fashion design and AI's contribution to sustainable practices in Fashion. The study concluded that Gen Z sees AI as the most effective tool to promote sustainability in fashion design. Future research topics will focus on the adoption of AI among Gen Z fashion designers, expanding the study to different geographical and cultural contexts, as well as focusing on consumer perspectives regarding AI-driven customization.

Keywords: Role of Artificial Intelligence, Fashion Design, Gen Z, Sustainable Future, Sustainability

Introduction

Artificial Intelligence has impacted various industries by improving efficiency, decision-making, and innovation. With a focus on fashion, AI is transforming the industry through predictive analytics for trend forecasting, automation of design processes, and personalized shopping experiences. AI-led tools analyse consumer preferences, that allow brands to design more targeted collections and reduce waste, promoting sustainability. Additionally, AI is driving innovations in virtual fitting rooms, helping consumers visualize garments before purchase and using machine learning algorithms to create unique, data-driven designs. This fusion of creativity and technology is leading to a more efficient, customer-focused, and sustainable fashion industry. Gen Z's perspectives are vital to the fashion industry as they represent the next generation of consumers and influencers, shaping future trends and needs. As digital locals, Gen Z has become submerged in technology, making them very susceptible to AI-based innovations such as virtual tests, personalized shopping experiences, and sustainable modeling solutions. Their values, including a great emphasis on sustainability, inclusivity, and authenticity, influence their purchasing decisions, encouraging brands to adopt more ethical and environmentally friendly practices.

Theoretical Framework

Technology Acceptance Model (TAM) developed by Davis (1989) suggests that perceived the utility and the perceived ease of use are key factors that affect individuals' acceptance of new technology. TAM can help analyze how Gen Z perceives the utility of AI in fashion design and whether they find it easy or difficult to adopt due to challenges such as technical skills or ethical concerns.

Sustainability Theory in Consumer Behaviour focuses on how consumers' values, attitudes, and beliefs drive sustainable consumption behaviour. Gen Z is known for its strong stance on sustainability. The theory supports understanding of how they consider AI to promote fashion and sustainability and whether it corresponds to the values of its moral and ecological consciousness.

Literature Review

The intersection of artificial intelligence (AI) and sustainability in fashion design has received considerable scholarly attention, particularly with regard to Generation Z's perspectives on this development. A study by Choi and Cheng (2020) highlights the transformative potential of artificial intelligence to improve supply chain efficiency and thereby promote sustainable practices in the fashion industry. They believe that AI technology can simplify operations, reduce waste, and optimize resource allocation, creating to a more sustainable fashion ecosystem. Similarly,

Bhandari and Jain (2021) explore the impact of Artificial Intelligence on retail industry, highlighting its role in personalizing consumer experiences while promoting sustainable consumption patterns. They argue that AI-powered data analytics can enable brands to create more sustainable products by adapting to consumer preferences for ethical and environmentally friendly practices.

Additionally, the role of AI in sustainable material sourcing has been addressed by Robinson (2021), who discusses how AI can facilitate the identification of sustainable materials and suppliers, thereby supporting environmentally friendly practices in industry. D'Aveni (2022) explores this further by examining how artificial intelligence can improve supply chain transparency, enabling brands to effectively track their sustainability performance. With this increasing influence of generations in the fashion market, their unique features and values are important to understanding this landscape. Francis and Hoefel (2018) pointed out that Gen Z is likely to prioritize the use of sustainable brands, which shows that the consumer expectations of brands navigation.

In addition, studies have shown that AI technologies can improve consumer involvement and promote sustainable practices through innovations such as virtual fitting rooms, as emphasized by Lee (2023). This is according to Yuan and Wu (2022), results that provide a comprehensive literature review that shows how AI can drive sustainable fashion initiatives. These insights illustrate the critical role of AI in transforming the fashion industry towards sustainability while underscoring the need of understand the perspective of Generation Z in order to drive meaningful change in the industry. Ultimately, the synthesis of these works reveals that the convergence of artificial intelligence and sustainability creates not only opportunities for innovation, but also challenges that need to be addressed to meet the demands of a socially conscious consumer base.

Research Gap

Existing literature is needed to understand Generation Z's perspectives on integrating artificial intelligence and sustainability into fashion design. Specifically, there needs to be more research into the challenges Gen Z faces when adopting AI technologies and how they envision sustainability opportunities in the industry. In addition, studies often ignore cultural and regional changes in the attitude of the Gen Z's, as well as cultural and regional changes in fashion design education. Solution to these shortcomings will provide valuable insights into brands and educators to effectively participate in this influential audience.

Objectives of the Research

1. To understand Gen Z perspectives on the role of AI in fashion design.

2. To analyze the challenges Gen Z faces in adopting AI for fashion design.
3. To explore the opportunities AI offers to promote sustainability in Fashion as perceived by Gen Z.

Research Methodology

Sample Selection and Size

Criteria for Sample Selection

The researcher collected the data from college students enrolled in Fashion Designing and Fashion Technology courses in Coimbatore. To narrow the sample, criteria were established to select the top five colleges, focusing on institutions with a strong reputation for fashion design, well-established sustainability programs, and both undergraduate and postgraduate offerings in fashion design. Out of the 612 students, a sample of 373 is considered as per the power analysis. A structured questionnaire was designed to pool the data, and the reliability of the main factors was tested and confirmed using Cronbach's alpha.

- Age range: Focused on the Gen Z cohort (aged 18-24 years).
- Geographic location: Coimbatore, where awareness about AI and sustainability is expected to be greater.
- Technical knowledge: The Participants' basic understanding of technology and AI has been identified. A Pilot study was conducted with a pre-screening question to assess familiarity with terms related to AI in fashion design.
- Interest in sustainability: Students who have a personal interest in sustainability for the study as this is essential to focus the study on the role of AI in promoting sustainable fashion.

Sample Size

- Quantitative Data (Survey): To ensure statistical power and representativeness of the sample, the survey was with a sample size of 373 respondents.
- Qualitative Data (Focus Groups): To collect meaningful and in-depth qualitative information, three to five focus groups of six to ten participants each was organized.

Data Collection Methodology

An online questionnaire with structured questions (including closed-ended and Likert-scale questions) was used to collect participants' perceptions on AI in fashion, challenges, opportunities, and sustainability. They targeted fashion design students in Coimbatore, drawn from the top five colleges with a strong reputation in fashion design and technology. Researcher have covered the largest Gen Z using Instagram, LinkedIn, and student forums.

Data Analysis and Interpretation

H1: There is a statistically significant difference in Gen Z's perspectives on the role of AI in fashion design across different levels of familiarity with AI.

Table No.1
Familiarity with AI and Gen Z's Perception of AI's role in enhancing Fashion Design

AI Role		Sum of Squares	df	Mean Square	F	Sig.
AI Boosts Design Innovation	Between Groups	30.605	4	7.651	7.066	.001
	Within Groups	398.500	368	1.083		
	Total	429.105	372			
AI in Trend Analysis	Between Groups	27.796	4	6.949	5.426	.001
	Within Groups	471.276	368	1.281		
	Total	499.072	372			
Enhances Personalization	Between Groups	26.004	4	6.501	5.050	.001
	Within Groups	473.755	368	1.287		
	Total	499.759	372			
Increases Efficiency	Between Groups	26.991	4	6.748	5.436	.001
	Within Groups	456.767	368	1.241		
	Total	483.759	372			
Design Assistance	Between Groups	28.189	4	7.047	4.795	.001
	Within Groups	540.883	368	1.470		
	Total	569.072	372			

Table No.1 shows that there are significant differences (Sig. <.001) across the five factors; it supports the hypothesis that " there is a statistically significant difference in Gen Z's perspectives on the role of AI in fashion design across different levels of

familiarity with AI." Thus, the ANOVA results confirm the hypothesis by showing that familiarity level influences perspectives on AI's role in fashion design.

Table 2
Gen Z's Challenges in Adopting AI in Fashion Design

No.	Challenges	Mean Rank
1	Data Privacy	2.00
2	Ethical Concerns	3.42
3	Limited Data Quality and Availability	5.44
4	Creative Freedom	2.25
5	High Cost	4.39
6	Lack of Knowledge	5.15
7	Resistance to Change	5.36

Table 2 shows that the majority of respondents ranked data privacy as the top challenge to adopting AI in fashion design, followed by creative freedom, ethical concerns, high cost, lack of knowledge, and

resistance to change. The test statistics also reveal that this factor is significant (0.001) at 1%.
H2: Gen Z perceives AI as a significant opportunity to promote sustainable Fashion.

Table 3
Educational Level and Gen Z Perception of AI for promoting sustainability in Fashion

Variables		Educational Level	AI provides an opportunity for sustainability in Fashion
Educational Level	Pearson Correlation	1	.399**
	Sig. (2-tailed)		.000
	N	373	373
AI provides an opportunity for sustainability in Fashion	Pearson Correlation	.399**	1
	Sig. (2-tailed)	.000	
	N	373	373

** . Correlation is significant at the 0.01 level (2-tailed).

Table 3 shows that from the correlation analysis, the Pearson correlation coefficient between education level and AI of 0.399 provides an opportunity for mode robustness with a p-value of 0.000, indicating a moderate positive

correlation, meaning that as the education level increases, so does the awareness of the role of AI in promoting sustainability in fashion. The correlation is statistically significant at the 0.01 level, suggesting that this relationship is likely not due

to chance. Thus, a higher level of education translates into greater awareness among Gen Z of the opportunities that AI brings for sustainability in the fashion industry.

Discussions and Implications for Gen Z

The study's findings highlight that while AI can significantly improve the efficiency of the design process, many Gen Zers fear it could stifle creativity. They will need to learn to use AI as a complementary tool, not a substitute for human creativity. The focus should be on integrating AI into areas such as pattern making, fabric selection, and the iterative design process, allowing them to maintain creative control over the final aesthetic. AI's ability to improve material optimization, predict trends, and personalize designs creates opportunities for Gen Z to explore new ways of innovating in fashion. Gen Z can use AI to push the boundaries of sustainable material selection and design customization. AI can be used to create personalized experiences for consumers, offering bespoke clothing based on AI-analyzed body data and personalized style suggestions, meeting the growing demand for personalized fashion.

Limitations and Suggestions for Future Research

This study is limited by its focus on Gen Z fashion design students, which may not fully represent the diverse perspectives within the broader Gen Z population or other disciplines. Additionally, rapid advancements in AI could quickly render findings outdated, as perceptions may shift with new technological developments.

Future research could include broader demographic, including Gen Z's from diverse professional backgrounds, to achieve broader representation. Cross-cultural studies could further explore how regional differences influence AI adoption in fashion. Longitudinal studies are also recommended to track changing perceptions as AI technology advances, providing a more dynamic understanding of Gen Z's engagement with AI in fashion over time.

Conclusion

This research provides valuable insight into Gen Z's views on the role of AI in fashion design, highlighting both the challenges and opportunities AI brings to the industry. With their unique digital fluency and strong commitment to sustainability, Gen Z is positioning themselves as key adopters and astute evaluators of AI-powered innovations in fashion, influencing the industry's direction towards more sustainable practices. Findings of the study show that while Gen Z recognizes the potential of AI to drive creativity and sustainable practices, they also face challenges, including skill gaps and ethical concerns. Addressing these barriers through education, increased accessibility, and ethical

standards in AI development could accelerate the adoption and use of AI in the fashion industry. This study emphasizes the importance of understanding the generations of technology and provides the basics of future research on AI's role in the formation of stable and innovative fashion.

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