



Original Article

Examining the Interplay of Artificial Intelligence-Driven Sustainability and Consumer Trust in Luxury Fashion Purchasing Decisions

Jagadishwar Reddy Reddygari
Independent Researcher, India.

Received On: 28/04/2026 Revised On: 27/05/2026 Accepted On: 04/06/2026 Published On: 10/06/2026

Abstract: This Luxury Fashion Industry (LFI) is going through a radical change because of the adoption of AI technologies and the role played by sustainability. These Luxury Fashion Brands (LFBs) are embracing innovative technologies like machine learning, predictive analytics, blockchain technology, virtual assistants, and intelligent recommendation tools for their business efficiencies, enhanced customer satisfaction, and sustainable practices. Meanwhile, people have become more aware about environmental sustainability, ethical sourcing, transparency, and sustainable consumption, which put pressure on LFBs for being more sustainable. This review paper identified the relationship between sustainability enabled by AI and consumer trust in purchasing Luxury Fashion Products (LFPs). It focuses on the ways through which these advanced technologies contribute to sustainable LF practices via waste elimination, smart inventory management, ethical supply chain activities, personalized customer engagement, and circular economy approach. In addition, this research focuses on the significance of factors that contribute to consumer trust such as transparency, authenticity, privacy assurance, use of AI technology ethically, and brand reputation to shape consumers' buying decisions. Moreover, some of the problems and ethical issues linked with the implementation of AI technology in organizations have been identified such as data privacy, lack of transparency in AI technology, greenwashing, job displacement, and dependence on technology. Furthermore, the study considers various possibilities in the future and suggestions to ensure that both human oriented LF and technological advancement can coexist successfully. This literature review suggests that the integration of AI technologies can support sustainability initiatives, enhance consumer trust, and improve operational efficiency within the LFI.

Keywords: Artificial Intelligence, Sustainability, Consumer Trust, Luxury Fashion, Purchasing Decisions, Digital Transformation, Ethical Fashion, Smart Technologies, Brand Loyalty.

1. Introduction

There have been a lot of changes within the LFI recently due to technological development and increased awareness regarding environmental sustainability. The LFI generally consists of factors such as uniqueness, quality, craftsmanship, heritage, and prestige. But due to shifting consumer demands and environmental issues, there is a need for LFBs to re-strategize themselves through the adoption of sustainable technologies. There are several emerging technologies that impact the LFI, one of which is AI, which is poised to transform the LFI [1]. Some of the AI technologies used in the LFI are machine learning, predictive analytics, virtual assistants, recommendation engines, blockchain technology, and smart logistics management. Due to concerns regarding climate change, resource depletion, waste production, unethical labor practices, and overconsumption, LF is focusing on sustainability. Consumers have become concerned about how their purchases affect the environment and society, and they are demanding that luxury companies be more transparent, ethical, sustainable, and responsible. AI is being used by LF companies to help them minimize waste, improve inventory management, enhance supply chain transparency, support circular economy efforts, and create more sustainable

products. Through AI technology, companies can analyze large amounts of consumer and operational data to make more informed decisions that result in reduced environmental damage without sacrificing luxury and customer satisfaction [2][3].

However, consumer trust has been identified as another important factor influencing purchasing decisions within LFI. The issue of consumer trust becomes critical in the LFI since customers do not buy just the products; they buy prestige, authenticity, and emotions. Though implementation of sustainability through AI technology may positively influence consumer perception regarding the brand, such concerns as privacy, human interaction, transparency, ethics of AI use, and authenticity of sustainability efforts might come into play. Specifically, consumers might doubt the true commitment of luxury brands to sustainability and believe that they are employing AI marketing to improve their image [4]. In this regard, the main aim of this research is to examine the relationship between the sustainability achieved by using AI in LF and the consumers' degree of trust in their purchasing decisions. As part of this research, special attention is paid to the contributions that can be provided by AI technologies

regarding the sustainability of LF initiatives, as well as their influence on the attitudes and buying behavior of consumers. This study also aims at examining the potential benefits and challenges associated with AI for supporting sustainable fashion initiatives.

While previous research has individually studied AI, sustainability, and consumer behaviour, there has been very little research done on how these three factors interact within the context of AI based sustainability efforts and consumers' trust in LF purchases. The purpose of this literature review is to fill that gap through an analysis of current literature in this field.

2. Digital Transformation in Luxury Fashion

The use of digital transformation and advanced technologies has been an innovation adopted in the LFI, hence changing many things concerning that industry[5]. The LFI had previously adopted traditional approaches such as the opening of physical retail stores, building relationships with individuals and offering a luxurious brand experience, among others. Due to the advancement in technology, changes in consumer behavior, and increased competition within the global market, LF companies have been forced to embrace new technologies to have an advantage over their competitors [6]. AI, big data analysis, virtual reality, blockchain, and smart retail systems have played a vital role in enhancing the performance and efficiency of operations, personalizing the experience for consumers, building better relationships with customers, and creating sustainable processes.

2.1. Evolution of Technology in Fashion Retail

There have been significant changes in the fashion retail industry due to technological advancements made within the last few decades. To start with, fashion retail initially relied entirely on conventional methods through the use of physical stores. Due to innovations in e-commerce, mobile apps, and electronic payment systems, fashion retail is now shifting towards online selling[7][8][9]. There have been significant technological innovations that have changed how customers interact with fashion brands through the introduction of innovations such as AI, machine learning, virtual changing rooms, and data analysis [10]. Through technology, fashion brands can understand their consumers' needs and predict trends in the market while optimizing their inventory.

2.2. Adoption of Smart Technologies in Luxury Brands

Smart technologies are also employed by LFBs in improving their performance while at the same time engaging consumers. Examples of such technologies range from recommendation engines, smart mirrors, virtual reality fitting rooms, authentication technology using blockchain and automation in supply chain management, among others [11]. Using smart technologies helps luxury brands to offer personalized services, product traceability, protect against counterfeits, and foster sustainability. Smart technologies are also used by LFBs in analyzing and promoting through digital marketing. Smart technologies help LFBs to outperform through greater efficiency, innovation, and competitiveness.

2.3. AI Innovation in Premium Fashion Markets

The innovation in AI technology is among the most notable technological innovations within the realm of premium fashion industries. AI technologies help luxury brands in collecting and analyzing huge amounts of consumer data in order to derive information regarding consumer behavior, fashion trends, and consumer preferences. Innovation in AI technologies includes innovative applications such as chatbots, virtual stylists, predictive analytics, and recommendation systems [12]. AI innovation helps in making LF industries sustainable by ensuring efficient inventory management and minimizing wastage. Innovation in AI is of great significance to premium fashion industries owing to improvements in decision making and creation of luxurious experiences that meet consumer demands.

2.4. Digital Consumer Engagement Strategies

Consumer engagement strategy refers to those ways that the LF firms utilize in engaging with consumers via digital technologies. There is a growing trend among LFBs to engage their consumers through the use of social media marketing, collaborations with influencers, AI personalization, mobile applications, and virtual stores, amongst others. Through digital technologies, interactive experiences like virtual try on, live streamed fashion events, and personalized suggestions are provided by the brands in order to enhance the convenience and experience of the customers [13]. Using digital consumer engagement strategies enables LF firms to share their sustainability, ethical, and other brand related activities to the consumers.

3. Conceptual Framework: Examining the Interplay of AI-Driven Sustainability and Consumer Trust in Luxury Fashion Purchasing Decisions



Fig 1: AI Framework in Luxury Fashion

The Above elements are shown in Fig. 1, shown below:

3.1. Artificial Intelligence

The conceptual framework represents the relationship between AI (AI), sustainability, consumer trust, and consumer behavior in the LFI. By using technology like predictive

analysis, smart logistics, and personalized experience created through AI technology, luxury brands are able to improve sustainable practices through resource management and ethical sourcing [14]. These factors make the luxury brand more transparent, authentic, and accountable, thereby influencing consumer trust. In turn, once consumers gain trust regarding a luxury brand and its use of AI technology, they are likely to develop purchase intent and brand loyalty.

3.2. AI-Driven Sustainability Practices

The use of AI-driven sustainability in LF entails the utilization of AI technology that drives companies to perform sustainable practices within the LFI. These AI technologies include machine learning, predictive analytics, smart logistics, and automation inventory which have become increasingly popular among LF firms for ensuring sustainability. By incorporating these technologies in their operations, companies are able to enhance sustainability through eliminating overproduction, minimizing wastage of materials, efficient resource usage, and energy efficiency in production and logistics. Moreover, the implementation of AI solutions allows LF firms to monitor carbon emissions, material sourcing, and unethical labor practices along their supply chains. AI helps the firms to generate more accurate production decisions from demand predictions through data analysis [15].

3.3. Consumer Trust Factors

The consumer trust factors are those things that will determine how much confidence the customers have in the LFBs and their application of AI technology in sustainable practices. The consumer trust factors will be crucial for the LF companies because people usually seek products that guarantee authenticity and quality. The LF companies should always consider various consumer trust factors that will help them enhance their sales [16]. Some of the factors include effective communication on sustainability practices, ethical utilization of AI technology, consumer data privacy, product authenticity, and brand reputation [17]. When the LFBs ensure that they have responsible sourcing, ecofriendly manufacturing processes, and credible sustainability claims, the consumers tend to trust them and purchase their products.

3.4. Consumer Purchasing Decisions

Purchasing decisions made by consumers are associated with the way consumers decide to evaluate, choose, and buy LFPs according to personal preferences, values, trust, and perceptions toward a specific brand. In the case of AI-supported sustainability, consumer decision making becomes more complicated because customers are guided by a range of issues including ethical supply chain management, eco friendliness, customized shopping, authentication, and transparency [18]. The usage of AI is important for luxury brands that need-to-know consumer behaviour to offer personalized recommendations and enhance customer engagement to affect purchasing decisions positively. Trust in sustainability and AI is crucial to make consumers willing to buy products, develop brand loyalty, and pursue sustainable consumption. Consumers also tend to make purchases due to emotional satisfaction, social status, and quality [19][20].

3.5. Business and Sustainability

The concepts of sustainability and benefits for businesses refer to the effect of positive nature created through the successful implementation of AI technology into the activities of LFBs. Through the effective application of AI, there will be improved operational efficiency, minimized wastage in production, optimal utilization of resources, and ethical management in the supply chain. The application of AI technologies in sustainability will not only create good corporate responsibility practices but will also lead to an increase in performance within the business [21]. This means that once consumers have a positive attitude towards the brand with regards to sustainability and the AI technology used, they become more satisfied with the product.

4. Challenges and Ethical Considerations

The integration of AI with sustainability in the LFI opens up various possibilities; however, on the other hand, it creates certain problems that need to be addressed. The implementation of technology in LFBs should go hand in hand with certain ethical considerations and sustainable practices. Issues such as privacy, transparency, data security, environmental impact, as well as the proper use of AI, have become very significant in recent times. It is important to find solutions to the challenges mentioned above.

4.1. Data Privacy and Security Concerns

In addition to data security and privacy challenges, there are various problems in applying AI in the LFI. AI systems collect and analyze large amounts of consumer data, including personal data, preferences, browsing history, payment options, and other information that is used for personalized shopping and marketing campaigns [22]. Although application of AI systems improves customer relationships and helps increase organizational efficiency, most customers do not feel comfortable when they hear about the collection of their personal data and its processing by luxury brands. As in case of any breach in data security, relationships with consumers will be negatively affected. Due to the nature of LF consumers, luxury brands must ensure adequate cybersecurity and provide customers with detailed information on data privacy [23].

4.2. Lack of Transparency in AI Systems

Transparency issues in AI refer to the inability of consumers to understand how AI technologies make decisions, offer recommendations, or generate sustainability information within the LFI. Since many AI technologies are based on complicated algorithms and automated processes that are difficult for consumers to comprehend, consumers might find themselves in the dark regarding how their personal information is handled, how recommendations are made, or how sustainability information is generated. Transparency problems in AI technologies are especially important in the LFI because brands need to build trust with consumers to succeed [24][25]. Consumers have started expecting brands in the LFI to be honest in their communication and be transparent about AI technologies, ethical production, and sustainability.

4.3. Greenwashing and Misleading Sustainability Claims

Greenwashing or misleading sustainability claims mean instances when LFBs overstate or mislead their customers about their environmental and/or ethical practices to seem more environmentally friendly than they really are. The increasing trend of consumer interest in sustainable fashion has prompted many luxury brands to rely on AI technology and employ digital communication methods to show their commitment to sustainability [26]. But while many brands may try to offer inaccurate or incomplete information related to their environmental footprint or ethical practices regarding waste reduction, for example, such a strategy would result in the loss of consumer trust. The LFI is one that places a high degree of importance on transparency, honesty, and truthfulness, and any consumer would expect from luxury brands a commitment to sustainability that goes beyond merely trying to build brand image [27]. Moreover, greenwashing can greatly jeopardize consumer trust in LFBs. Today's consumers are well informed about the topic of sustainability and assess whether there is any validity behind the claims made by analyzing the actions taken. Luxury brands should be extremely careful about misrepresenting or exaggerating their sustainability efforts, which can make consumers doubt the validity of what the brands are claiming about themselves and their AI-supported efforts in sustainability.

4.4. Employment and Workforce Challenges

The issue of workforce arises due to the introduction of AI and automation in the LFI. AI is applicable in many actions, such as inventory control, customer service provision, demand forecasts, and manufacturing processes. As a result, the need for the presence of workers in the process diminishes greatly [28]. Thus, there appears concern regarding possible job loss and insecurity on the one hand, and the inability to perform manual actions or engage in craftsmanship that is a part of the process of creation of LFPs. Yet, it should be mentioned that the role of human creativity and craftsmanship in brand building is critical. In addition, employees might need to obtain certain technological skills. Consequently, companies should find ways to make employees utilize the latest technology without ignoring their skills.

5. Future Prospects and Suggestions

The potential of AI toward sustainability within the LFI will rely heavily on the ability of luxury brands to reconcile the issues surrounding technology, ethics, sustainability, and consumer trust. In the era of the digital revolution, luxury brands need to focus on devising sustainable ways and means of integrating new technologies into their operations [29]. It is necessary for them to focus on developing sustainable and consumer oriented AI technologies that promote efficiency and emotional connection and brand loyalty between luxury brands and consumers. One important direction for future research in this regard should include the development of transparent AI technologies within the LFI. There exists a desire for people to learn more about AI system operations and recommendations as well as their contribution towards achieving sustainability. Yet another critical recommendation includes the implementation of better AI governance and data management techniques. AI technologies have always relied on consumer

data analysis and thus issues related to privacy and cyber security continue to gain relevance. Exclusive services form the essence of the luxury consumers' life; therefore, LFBs should develop data responsibility policies to manage customer personal data ethically and securely. Future research should be oriented towards identifying AI ethics governance frameworks that could be beneficial for technology and customers in the context of LF. There are great opportunities for utilizing AI in supporting circularity processes such as recycling services, second hand marketplaces, monitoring systems, forecasting tools, and waste management solutions [30]. AI holds great potential in facilitating circularity of fashion products by tracking their lifecycle stages, encouraging sustainable consumption behaviors, and reducing environmental harm throughout the production and logistics process.

Additionally, the LFBs should concentrate on attaining equilibrium between the advancements in technology and human oriented luxury experiences. Although technology increases personalization and efficiency, dependence on technology alone may cause luxury experiences to lose their emotional aspect because interaction with humans, arts, storytelling, and personal services still play a critical role in luxury experience. Therefore, luxury brands have no option but to incorporate human creativity into their services. Future research could look into how consumers perceive this balancing act of technology and human involvement within the context of LF shopping. One of the other possible areas to explore in the future is the investigation of intergenerational and cross cultural differences in consumers' acceptance of technology and sustainability provided by AI systems. Younger generations such as Millennials and Generation Z are typically more inclined to use digital technologies and engage in sustainable consumption behavior in comparison with their older counterparts. Nonetheless, the attitude toward AI, technology, sustainable consumption, and even ethical fashion differs from country to country and culture to culture. Conducting cross country analysis will help to identify how certain cultural norms affect perceptions of AI-based sustainable luxury brands and design more effective regional marketing strategies and initiatives.

In addition to marketing efforts, it is crucial for LF companies to pay attention to employment issues raised by adopting AI technologies. As the nature of work in the fashion industry changes and becomes increasingly based on automation and AI, companies need to make sure their employees get trained in necessary digital skills, acquire technological knowledge, and adapt to new working conditions. The key here is to ensure that AI is not used to replace employees' creativity and artistry but rather as an assistant in innovation and production processes [31]. Policy makers and industry regulators must set up ethical guidelines and sustainability standards for proper AI integration within the fashion industry. The future research direction will focus on the influence of public policies, global laws, and cross industry collaboration on sustainable digitalization in LF.

6. Literature Review

The review of literature on “Exploring the Impact of AI and Sustainability on Consumer Trust in LF Choices” indicates that AI, sustainability, and consumer trust are increasingly significant for revolutionizing the LFI. Studies conducted previously indicate that companies operating in the LFI have been employing various AI-based technologies such as predictive analysis, personalization, intelligent supply chain management, virtual assistance, and digital marketing platforms to improve their operations and relationships with consumers. It has been established that AI contributes significantly to sustainability as it helps reduce waste and manages inventories.

According to Rohit Nishant et al. (2020) the five major issues in conducting research related to AI applications in sustainable development include (1) dependency on past data in developing machine learning algorithms; (2) uncertain human behavior in relation to AI application, (3) enhanced risk of cybersecurity, (4) negative consequences of AI application, and (5) inability to measure the effect of the intervention. From the literature review it becomes clear that in future researches on the topic under discussion there should be (1) multilevel perspectives; (2) system dynamics approaches; (3) design thinking; (4) psychological and sociological approaches; (5) approaches to economic value generation to prove the point that through AI one can achieve both immediate and sustained environmental benefits [32].

AI technology continues to play an increasingly prominent role within the fashion industry. In this paper, Elias Kouslis et al. (2025) present the areas of focus in the application of AI in the fashion industry will be presented. This is accomplished by calculating the number of studies conducted within the field. Some useful findings that can guide future research within the field are also presented. Each selected study highlights the specific purpose served by the use of AI technology, the methods used to meet these purposes, and the metrics used to evaluate the results obtained. A possible question that may arise is what fashion products are being researched by academics [33].

A. Tursunbayeva et al (2024) discusses relevance of social media applications on the Internet and how fashion marketers can take advantage of developments in social media technology. Issues covered include mobile applications,

consumer decision making, and communication technology. Social Media and Online Consumer Decision Making in the Fashion Industry will interest students, brand managers, marketers, and researchers in social media technology, among others [34].

This paper seeks to evaluate brand names and their possible effects on consumer behavior when purchasing LFPs. T. Tarnanidis et al.(2025) this purpose, secondary research was conducted to examine this problem through the analysis of previous research outcomes and current findings published in foreign language bibliographies. First, they have reviewed the theoretical issue related to the management of brands in LF marketing. Based on the results of their literature review, it may be assumed that building brand names is a complicated task involving numerous considerations. It is crucial to have profound knowledge of the targeted audience and stick to such important aspects of a LF business as the exclusiveness, high quality, and popularity of the brand. Building a brand that evokes positive emotions in consumers is an important part of the strategy focused on brand names. Finally, they will discuss consumer behavior trends within the LF market [35].

Social media has never enjoyed such popularity in terms of utilization before. These lead to considerable changes in the manner in which individuals relate to one another, how they interact and share their ideas. Even the relationship with products, brand names and businesses in general has been altered due to this phenomenon. T Tarnanidis et al. (2023) address some interesting and relevant questions in relation to the fashion industry and social media in particular. To what degree does social media impact consumers’ behavior in buying products? Which one is the most popular social media tool? What is the impact of influential figures on consumers’ decisions when buying things? How powerful and influential is the electronic word of mouth (eWOM) [36]?

Collectively, the reviewed studies (Table I) indicate that AI technologies contribute to sustainability through resource optimization, inventory management, and supply chain transparency. The literature also suggests that consumer trust is strengthened when sustainability initiatives are communicated transparently and supported by ethical AI practices. However, concerns regarding data privacy, algorithmic transparency, and greenwashing remain important challenges that require further investigation.

Table 1: Summary of Literature on AI-Driven Sustainability, Consumer Trust, and Luxury Fashion Purchasing Decisions

Author(s) & Year	Research Focus	Key Findings	AI/Sustainability Contribution	Consumer Trust & Behavior Aspect	Research Gap / Limitation
Rohit Nishant et al. (2020)	Potential obstacles and promising avenues for AI's future in sustainability	Identified five major challenges: dependence on historical data, unpredictability of human behavior, cybersecurity risks, negative AI impacts, and difficulty measuring intervention outcomes	Highlighted the importance of AI in supporting long term sustainability and responsible environmental practices	Emphasized the need to include psychology, sociology, and economic perspectives to understand consumer responses toward AI systems	Limited focus on LFI and consumer trust in sustainable purchasing decisions

T. Tarnanidis et al. (2023)	The effect of social media on fashion industry customers' actions	Explained the growing influence of social media, influencers, and eWOM on fashion purchases	Demonstrated how digital platforms influence modern fashion communication and consumer interaction	Identified social media as a powerful factor affecting consumer trust, perceptions, and buying decisions	Limited emphasis on sustainable LF and AI ethical practices
A. Tursunbayeva et al. (2024)	Application of social media and online consumer decision making in the fashion industry	Outlined how new social media platforms, communication tools, and mobile apps have changed the fashion business	Highlighted digital technologies as tools for enhancing consumer engagement and brand communication	Showed that online interactions and social media significantly influence consumer purchasing decisions and engagement	Limited discussion on AI-driven sustainability and ethical concerns in LF
Elias Kouslis et al. (2025)	Application areas of AI in the fashion industry	Examined research trends, AI methods, evaluation metrics, and fashion product categories studied by researchers	Demonstrated how AI technologies are increasingly integrated into fashion operations and innovation	Indirectly linked AI applications to customer experience and future purchasing trends	Did not deeply examine sustainability and consumer trust factors in LF
T. Tarnanidis et al. (2025)	Influence of brand names on LF consumer behavior	Found that strong luxury branding depends on exclusiveness, quality, popularity, and emotional connection	Suggested that digital branding strategies can strengthen luxury market competitiveness	Emphasized that positive emotional branding strongly affects luxury consumer purchasing behavior	Did not specifically focus on AI-driven sustainability or transparency issues

7. Conclusion

There are some alterations taking place within the LFI due to AI and sustainability. This includes such AI techniques as prediction analysis, intelligent supply chains, recommendation engines, among others, which have made it easy for luxury brands to become sustainable and efficient in what they do. On the other hand, sustainability has become one of the key factors in shaping consumer behavior in today's world. This study focused on the effects of AI-based sustainability on the purchasing decision process for LF through consumer trust. From the results of the study, it can be seen that initiatives for sustainability enabled by AI have a positive effect on consumer perceptions and loyalty as well as buying intention as long as companies provide information in a transparent manner and exhibit authentic behaviour. However, the research has also outlined some of the challenges that will emerge as a result of integrating AI into their processes, including problems such as data privacy issues, insufficient transparency when using AI, greenwashing, challenges regarding changes to the workforce, and a decrease in human interaction in luxury retailing. To conclude, the effective combination of AI and sustainability creates numerous possibilities for LFBs to gain competitive advantages, enhance their sustainability performances, and build strong customer relations. LF firms need to combine their technological advancements with human values and ethics to satisfy consumers' demands. The implementation of sustainable and consumer oriented AI by LFBs will not only ensure their growth but also promote environmental and social sustainability in the global fashion sector.

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