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Chapter 11: Preserving the Human Touch in the Age of AI: Pursuing Sustainability in the Fashion Industry
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Chapter 11 - Preserving the Human Touch in the Age of AI: Pursuing Sustainability in the Fashion Industry

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Abstract

The fashion industry is often cited as the second most polluting industry globally. Achieving environmental, social, and economic sustainability requires substantial investment in technological innovations and revised practices to transform traditional manufacturing and distribution processes. Artificial Intelligence (AI) presents a promising solution to enhance sustainability initiatives through various mechanisms: product innovation to minimize material waste, process optimization to optimize resource utilization, inventory management systems to prevent overproduction, and data-driven consumer engagement to promote conscious consumption. However, the implementation of AI technologies also faces significant challenges and skepticism, including potential risks to established brand values, complexities in maintaining meaningful employee engagement, and the delicate balance of preserving consumer trust in an increasingly automated environment. This chapter explores the current state of AI adoption in the fashion industry and its short- and long-term implications. Through a case study involving interviews with key executives in AI, sustainability, retail strategy, global guest innovation, localization, circularity innovation, global production, and creative direction at a leading athleisure brand, this research investigates the multifaceted opportunities, challenges, and potential risks associated with AI implementation across various organizational functions. The findings offer strategic insights and practical recommendations to guide future AI development and deployment. By providing a nuanced understanding of AI's role in driving sustainability, this study contributes to both academic discourse and industry practice, shedding light on how the fashion sector can leverage AI to achieve its sustainability goals.

Keywords: *artificial intelligence (AI) in fashion, fashion industry sustainability, retail*

technology, sustainable business practices, fashion industry;

11.1 Introduction

Recent global surveys indicate a shift in CEO priorities, with sustainability concerns being superseded by more immediate issues such as disruptive technologies, growth imperatives, inflation, and geopolitical uncertainty (Bain & Company, 2024a). Meanwhile, the luxury sector is increasingly exploring the potential of AI, with pilot projects suggesting that adoption rates may soon double (Comité Colbert & Bain & Company, Inc., 2024). However, the industry remains cautious, emphasizing the necessity for AI to operate discreetly, enhancing rather than overshadowing the authenticity, exclusivity, and intimacy that define luxury. Striking a balance between technological innovation and the irreplaceable human touch remains a critical challenge.

AI is already transforming the fashion industry, driving advancements in supply chain optimization, design processes, and customer experiences through data-driven insights and feedback loops. These innovations not only enhance efficiency and personalization but also hold promise for sustainability by reducing waste and returns, thereby benefiting both businesses and the environment (Forbes Technology Council, 2023). Yet, it remains uncertain whether AI can transform the luxury fashion industry into a model of sustainability.

This chapter investigates the rise of AI and its implications for sustainability in the fashion industry, using a case study approach focusing on an athleisure brand. While existing research on AI in fashion is fragmented and often confined to specific stages of the supply chain (Giri et al., 2019), this study provides an updated perspective on how the sector is leveraging AI (Ramos et al., 2023). Through interviews with experts in sustainability and AI within a leading athleisure fashion brand, the book chapter provides a realistic assessment of current practices and potential future developments. By integrating academic and practical insights, this research seeks to deepen the understanding of AI's potential to drive sustainable transformation in the fashion industry

11.2 Literature Review

This chapter provides a comprehensive review of the literature, focusing on the role of AI in the fashion industry and its potential to promote sustainability. It begins by defining AI and outlining its historical evolution, highlighting key advancements and applications relevant to the fashion sector. Following this, the review examines the multifaceted concept of sustainability, exploring its environmental, social, and economic dimensions. By establishing these foundational definitions and exploring the current landscape of AI applications, this review sets the stage for a critical analysis of how AI technologies can support sustainable practices in the fashion industry.

Despite growing interest in AI as a tool for enhancing sustainability, the current body of academic research on AI in the fashion industry is relatively limited and fragmented (Giri et al., 2019; Ramos et al., 2023). This review addresses this gap by synthesizing insights from diverse sources, including academic studies, industry reports, and trade publications. It critically evaluates the existing literature to identify key themes, research gaps, and areas needing further investigation. This chapter aims to provide a nuanced understanding of the potential and limitations of AI in promoting sustainability within the fashion industry, setting

the stage for a more in-depth exploration of these issues in subsequent chapters.

11.2.1 Artificial Intelligence

Artificial Intelligence (AI), a term coined by Stanford Professor John McCarthy in 1955, is defined as "the science and engineering of making intelligent machines" (Manning, 2020, p. 1). Initially focused on programming machines to perform specific tasks, such as playing chess, modern AI emphasizes machine learning, enabling systems to learn and adapt in ways analogous to human learning. Today, AI plays a crucial role in the fashion industry, driving innovation in design, production, e-commerce, personalization, and supply chain management (Bieńkowska, 2024). These advancements not only improve operational efficiency but also create opportunities to support sustainability.

The rise of Big Data in the early 2000s and the subsequent proliferation of machine learning in the 2010s significantly advanced analytical AI (Comité Colbert & Bain & Company, Inc., 2024). However, the adoption of AI solutions remains limited due to the substantial upfront investments required in software, hardware, and skilled personnel (McKinsey & Company, n.d.). For AI tools to be effective, they must have access to reliable customer and product data across multiple channels, as well as precise use cases (Comité Colbert & Bain & Company, Inc., 2024). Despite AI's transformative potential, its high implementation costs mean that only large, well-resourced companies can fully leverage these technologies, creating a digital divide in the industry.

11.2.2 ChatGPT: Proliferation of AI

Generative AI, unlike traditional AI, creates new content by extrapolating from training data. ChatGPT, launched in November 2022, exemplifies this capability by producing human-like text, images, and audio (Pavlik, 2025). McKinsey & Company (2023) estimates that generative AI could generate $6.1-7.9 trillion in annual economic benefits through increased productivity. The technology's accessibility is a key advantage: companies can leverage existing teams to customize AI models with internal data. Luxury fashion brands have rapidly adopted generative AI technologies to enhance their digital presence and customer experience. Several notable implementations include (Jing Daily, 2024):

Brunello Cucinelli developed an AI-powered website in July 2024, featuring immersive content and Solomei AI, their machine-learning customer service system. The platform demonstrated immediate success, attracting more than 10,000 daily visitors within its first week.

Balenciaga incorporated AI technology into their Winter 2024 Paris Fashion Week presentation, utilizing AI-generated visuals displayed on LED screens throughout their runway show, which garnered substantial media attention.

Gucci expanded their digital offerings in April 2024 by integrating Apple's Vision Pro headset technology, enabling customers to experience their short films and digital archives through augmented reality.

Dior launched Astra at VivaTech 2024, a sophisticated AI platform designed to analyse consumer data and adapt to customer preferences, improving their ability to respond to market demands.

11.2.3 DeepSeek: Democratization of AI

In 2024, DeepSeek, a Chinese AI company, has gained attention for its open-source models and engineering innovations, which reduce the cost of training and inference for large-language models (Qu, 2024). By optimizing AI algorithms, DeepSeek minimizes energy consumption, thereby contributing to environmental sustainability (Laws, 2025). Its rapid adoption, including integration with Microsoft, AWS, and Nvidia platforms, underscores its potential impact (Bain & Company, 2024b).

The focus of AI development is shifting from creating the "smartest" models to prioritizing practical applications that drive economic value. Open-source AI democratizes access, enabling smaller companies to innovate and deploy efficient models, making AI more accessible and practical (Zhou, 2024). This shift emphasizes cost-effective innovations over sheer intelligence, fostering broader participation and consumer benefits.

11.2.4 Sustainability

The fashion industry is often cited as the second most polluting industry globally, responsible for 10% of annual carbon emissions—more than international flights and maritime shipping combined (United Nations Environment Programme, 2019; World Bank, 2019). Michael Møller (2016), Director-General of the United Nations, emphasized that "business as usual is not an option anymore." With less than five years remaining to achieve the 2030 Sustainable Development Goals, the luxury fashion industry must reinvent itself to align with sustainability principles.

The United Nations defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, n.d.). This definition emphasizes the interconnectedness of economic growth, social inclusion, and environmental protection. This study adopts this framework to explore AI's impact on the economic, social, and environmental dimensions of fashion.

11.2.5 Economic & Environmental Benefits to the Company

AI is transforming industries, including healthcare, by enhancing diagnostic accuracy, enabling personalized treatments, and accelerating drug discovery (Sreedharan et al., 2019; Antons & Breidbach, 2023). In the fashion industry, AI contributes to sustainability in several ways (Ramos et al., 2023):

Supply chain optimization: AI improves efficiency by optimizing procurement, manufacturing, and distribution processes. For example, Zara uses intelligent algorithms to enhance supplier collaboration and logistics management (Cao, 2024).

Sustainable design and sales: AI analyses trends and consumer preferences to create sustainable designs and personalized shopping experiences. Lululemon, for instance, uses AI to refine customer search queries and partners with Samsara Eco for textile-to-textile recycling (Indian Express, 2024; Lululemon, 2024).

Waste reduction: AI predicts waste generation and automates recycling processes. Stella McCartney collaborates with Google Cloud to improve sustainability in her supply chain (Computer Weekly, 2024).

Data analysis: AI-driven insights help companies forecast demand, optimize inventory,

and reduce overstocking. H&M, for example, uses AI to minimize unsold clothing (Reuters, 2019).

11.2.6 Social Benefits to the Consumer & Employee

AI plays a transformative role in enhancing social sustainability within the fashion industry by optimizing processes, promoting eco-friendly practices, and fostering deeper consumer engagement (Boston Consulting Group, 2024). Despite the growing adoption of AI tools, consumer awareness remains relatively low. According to Bain & Company (2024c), 71% of customers reported being unaware of having used generative AI during their online shopping experiences, even though they had likely interacted with retailers employing such technologies. Despite this lack of awareness, consumers are optimistic about the potential of generative AI, with approximately half believing it holds significant or transformative promise. Shoppers prefer AI-driven features integrated into their shopping journeys, such as review summaries, over standalone tools. Additionally, consumers are willing to share personal data to enable AI-driven personalization, which can enhance customer service efficiency, especially in complex or challenging aspects of the shopping journey.

For employees in the fashion industry, AI contributes to social sustainability by promoting fair labour practices, enhancing supply chain transparency, and ensuring equitable treatment and compensation for workers (Comité Colbert & Bain & Company, Inc., 2024). AI systems can monitor compliance with labour laws, thereby reducing exploitation and improving working conditions. Furthermore, AI facilitates skill development by providing workers with opportunities to adapt to technological advancements, enhancing their employability and job satisfaction (Boston Consulting Group, 2024). By automating repetitive and physically demanding tasks, AI also reduces physical strain on workers, allowing them to focus on more skilled and creative activities (Rathore, 2019). This shift not only improves productivity but also enhances job satisfaction and overall well-being.

11.2.7 Risks and Concerns

Despite its potential benefits, integrating AI into the fashion industry is not without risks and ethical concerns. Yuval Noah Harari, a prominent historian and author, offers a cautionary perspective on the challenges posed by AI and highlights several critical issues:

AI and human agency: Harari warns that AI systems could undermine human autonomy by controlling the information individuals consume, potentially manipulating behaviour and eroding free will. This raises concerns about the ethical implications of AI-driven decision-making processes (Gardels, 2025).

The future of work and inequality: The widespread adoption of AI and automation threatens to disrupt labour markets, potentially rendering many jobs obsolete. Harari cautions that this could exacerbate inequality, creating a divide between those who control AI technologies and those displaced by them (Cooper, 2021).

Ethical considerations in technology: Harari emphasizes the importance of embedding ethical principles into the development and deployment of AI technologies. Without a strong ethical foundation, technological progress may lead to unintended consequences that prioritize efficiency over human well-being (Thompson, 2023).

To address these concerns, it is essential to establish robust ethical AI governance frameworks that prioritize transparency, mitigate bias, and ensure accountability. Organizations

must also focus on safeguarding data privacy, engaging stakeholders, and investing in AI literacy to build trust and ensure compliance with ethical standards (KPMG, 2021). Adopting a human-centric approach to AI development, where technology aligns with societal values and responsibly augments human capabilities, is critical to mitigating risks and maximizing benefits.

11.2.8 Gaps in Literature

The academic exploration of AI's impact on sustainability in the fashion industry reveals several significant gaps that require further investigation. These gaps include:

Unintended consequences of AI implementation: While existing research emphasizes the potential benefits of AI in advancing sustainability, there is limited academic attention on the unintended negative consequences of AI deployment. These include ethical dilemmas, labour displacement, and environmental impacts resulting from increased automation and reliance on AI technologies (Giovanola et al., 2023).

Empirical studies and real-world applications: A notable gap exists in empirical research that evaluates the real-world impacts of AI applications on sustainability outcomes in the fashion industry. Much of the current literature focuses on theoretical frameworks or conceptual models, with insufficient case studies or practical insights into successful AI implementations and their measurable effects on sustainability metrics (Santhanam & Khare, 2024).

Interdisciplinary approaches: There is a pressing need for interdisciplinary research that integrates technological, social, economic, and environmental perspectives. Current studies often narrowly focus on the technological aspects of AI, neglecting its broader implications for sustainability. This limits the understanding of how AI can be responsibly applied to achieve holistic and sustainable practices (Sahota, 2024).

11.2.9 Research Objective and Questions

This study aims to address these gaps by examining both the positive and negative implications of AI in the fashion industry through a comprehensive case study. The research seeks to answer the following questions:

- Research Question 1: Where is AI currently being applied in the fashion industry?
- Research Question 2: What are the near-term opportunities and challenges associated with AI adoption?
- Research Question 3: What are the longer-term vision and potential risks of AI in the fashion industry?

Through a real-world case study, this research explores AI's current and future role in the fashion industry. The following sections present the research framework, analyze the case study findings, and examine research gaps, implications, and limitations.

11.3 Methodology and Framework

This study employs a qualitative case study methodology (Yin, 2018) to examine the

intersection of AI and sustainability initiatives in the fashion industry. The qualitative approach facilitates an in-depth understanding of AI implementation and its sustainability implications (Creswell & Poth, 2018), while the case study design enables detailed examination of this contemporary phenomenon within its real-world context (Yin, 2018). By focusing on a single fashion brand, this research provides comprehensive insights into the complexities of AI integration for sustainability purposes.

11.3.1 Data Collection Methods

Semi-structured interviews were conducted with 12 executives involved in AI and sustainability initiatives. Participants represented diverse functional areas: AI, sustainability, retail strategy, global guest innovation, localization, circularity innovation, global production, and creative direction. To ensure confidentiality, participants were assigned alphanumeric codes (ind_01 through ind_12). The initial interviews targeted the heads of sustainability and AI departments, with subsequent participants identified through interviewees' recommendations. Data collection continued until theoretical saturation was achieved (Fontanella et al., 2011).

Interviews were conducted face-to-face between January 21 and February 14, 2025, averaging 30 minutes in duration. Verbatim notes were recorded and verified for transcription accuracy (Rodríguez et al., 2024). The semi-structured interview protocol explored four key areas: (a) current AI applications within specific domains, (b) perceived benefits and implementation challenges, (c) potential risks and ethical considerations, and (d) future vision for AI in fashion. Sample questions included "How does your department utilize AI to advance sustainability objectives?" and "What primary challenges have you encountered in AI implementation?"

11.3.2 Data Analysis Procedures

Data analysis was conducted using Iramuteq software (Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires), which facilitates systematic text analysis through theme identification, keyword association, and linguistic pattern recognition (Mennani & Attak, 2024). The analysis proceeded in three phases (Carvalho et al., 2020: Rodríguez et al., 2024; Souza et al., 2018):

1. Descending hierarchical classification (DHC): This method categorizes active words into lexical classes by segmenting and comparing context units based on lexeme content, identifying stable distributional patterns.
2. Correspondence factor analysis (CFA): This technique generates graphical representations of word and class proximities derived from DHC, focusing on relational patterns rather than frequency counts. Analysis interpreted relationships along both horizontal and vertical axes.
3. Lexicographic analysis: This phase examined word frequency and distribution patterns within the text corpus through similarity analysis.

The research adhered to established ethical guidelines, with all participants providing informed consent prior to participation. Participants were advised of the study's purpose, their right to withdraw, and measures ensuring anonymity and confidentiality.

11.4 Discussion and Findings

This chapter presents an analysis of the interview data gathered from experts in the fashion industry. Key themes and insights were identified using Iramuteq. The findings are discussed in relation to the research questions guiding this study.

11.4.1 Results

The study included 12 respondents, with an equal gender distribution. The participants' professional backgrounds were diverse: 4 (33%) had retail-related experience, 3 (25%) were in AI, 3 (25%) in production, and 2 (17%) in sustainability.

Descending Hierarchical Classification (DHC)

Data were processed using Iramuteq software, resulting in a corpus of 12 texts divided into 106 segments, with 78 segments (73.58%) used for analysis. The dendrogram (Figure 1) visually represents the clustering of interview transcripts based on content, revealing six distinct classes. Each class represents a cluster of text segments sharing similar themes, with percentages indicating the proportion of text within each class.

Theme 1: Operational efficiency and sustainability in production and retail. This theme encompasses Class 4 (18%) "customer experience and engagement," Class 1 (15.4%) "supply chain and production," and Class 5 (16.7%) "materials and sustainable practices." These classes are interconnected with the operational facets of the business, where AI is deployed to enhance efficiency, minimize waste, and foster sustainability. The emphasis is on tangible elements such as materials, supply chains, and retail operations.

Key areas include:

- Sustainable materials and recycling: AI helps source and develop sustainable raw materials, optimize recycling processes, and reduce waste.
- Supply chain optimization: AI improves production planning, reduces overproduction, and ensures the right products are available at the right time.
- Retail and customer experience: AI enhances guest interactions, supports educators in stores, and manages takeback programs for recycling or resale.

Theme 2: Innovation, brand development, and future planning. This theme includes Class 6 (15.4%) "branding and content development," Class 2 (20.5%) "future-oriented product development," and Class 3 (14.1%) "AI and machine learning applications." These classes concentrate on strategic and innovative business aspects, utilizing AI for future planning, brand enhancement, and identification of new opportunities. The focus is on data-driven decision-making and leveraging AI to create value in marketing, product development, and customer engagement.

Key areas of focus are:

- Brand development and content creation: AI helps train employees, develop brand strategies, and create high-quality content.
- Future planning and e-commerce: AI optimizes product assortments, improves website functionality, and enhances communication to align with future goals.

- Machine learning and opportunity identification: AI identifies new opportunities, matches products to customer preferences, and drives innovation across the business.

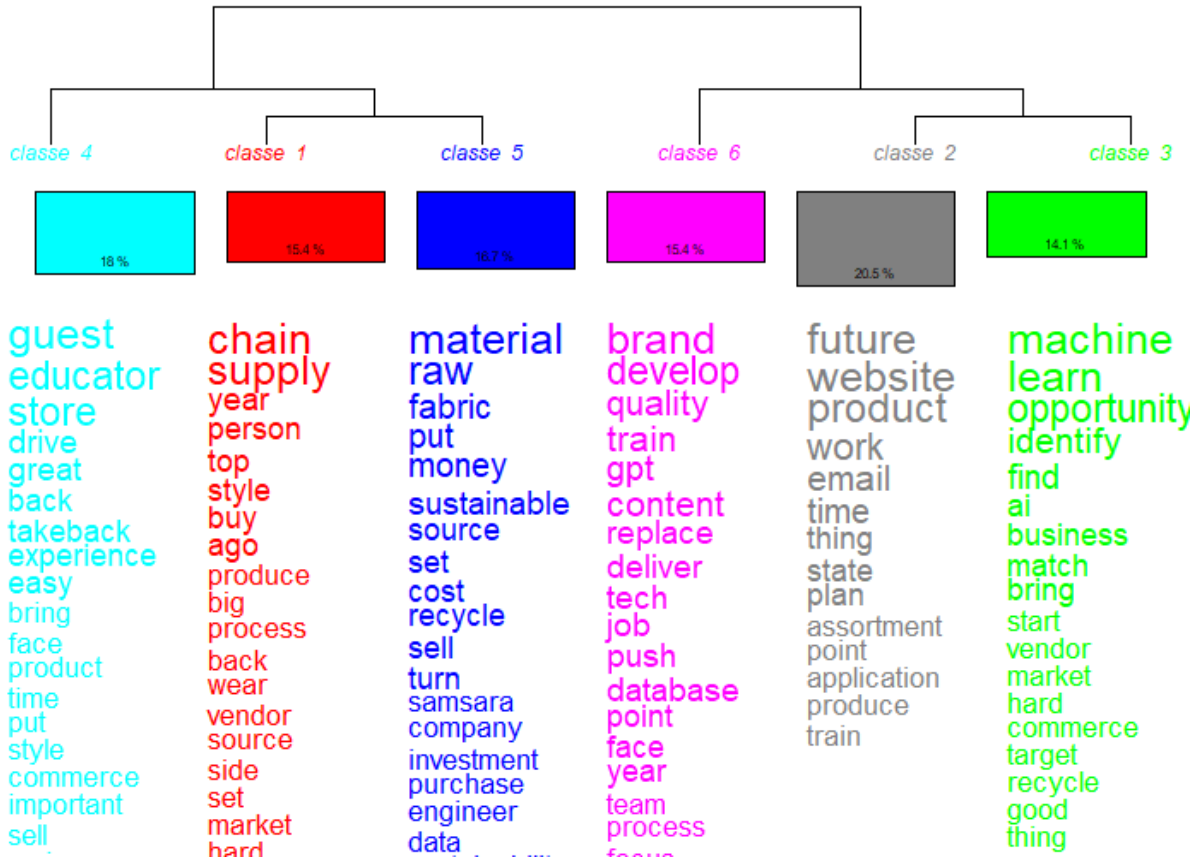

Figure 1

Dendrogram illustrating the hierarchical clustering of interview transcripts based on thematic content.

Correspondence Factor Analysis (CFA)

The CFA (Figure 2) identified two primary factors, explaining 47.03% of the total variance (Factor 1: 25.36%, Factor 2: 21.67%). These factors represent underlying dimensions structuring the textual data. The spatial arrangement of terms on the CFA plot reveals relationships between themes. For example, the proximity of "innovation and technology" to "future-oriented product development" suggests a strong link between technological advancements and future planning. The dendrogram supports these interpretations by clustering related terms, such as "customer experience and engagement," reinforcing the importance of this theme.

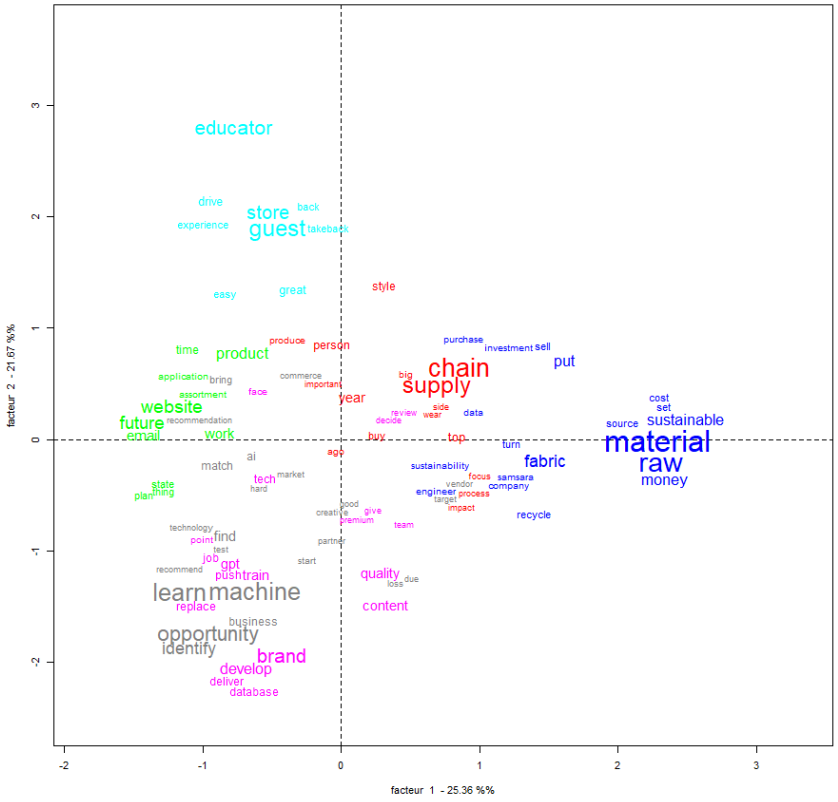

Figure 2

Correspondence factor analysis (CFA) plot showing the relationships between key themes identified in the interview data.

Lexicographic Analysis

The similarity graph (Figure 3) illustrates relationships between words based on co-occurrence, where nodes represent words and edges indicate association strength. Thicker lines indicate stronger associations, while thinner lines indicate weaker ones. Spatial arrangement provides clues to relationships, with closer words being more semantically related. The analysis highlights:

- Sustainability as a core value: The prominence of the "sustainability and materials" theme indicates that sustainability is a central value influencing decision-making.
- Data-driven retail: The "customer experience and retail" theme underscores leveraging data and technology to enhance customer experience and personalize interactions.
- AI-powered innovation: The "artificial intelligence and innovation" theme highlights the potential of AI and machine learning to drive innovation and improve efficiency.

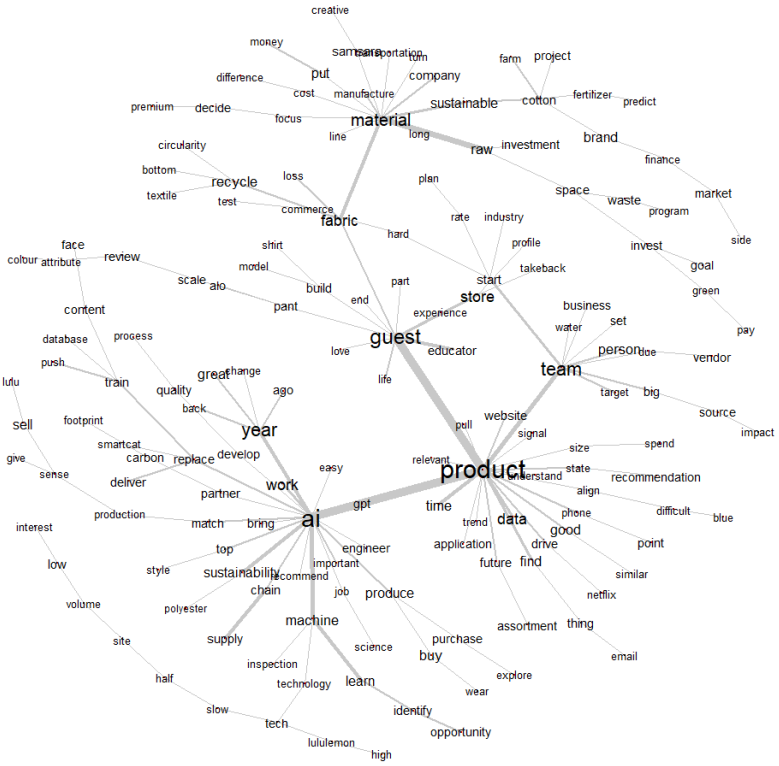

Figure 3

Similarity graph visualizing the co-occurrence relationships between words in the corpus.

11.4.2 Broader Implications and Future Outlook

The analysis of expert interviews using Iramuteq software provided valuable insights into the applications of AI in the fashion industry as well as associated opportunities. This effectively addressed research questions 1 and 2. However, efforts to explore longer-term visions and risks (Research Question 3) did not yield significant patterns. This may be attributed to a generally positive outlook on AI adoption among interviewees that potentially overshadowed discussions on future risks; insufficient emphasis on eliciting perspectives on potential long-term hazards; or limitations in data analysis methods to capture speculative responses. In fact, most interviewees often appeared not to have thoroughly considered long-term implications.

The Dark Side: Potential Risks and Challenges of AI Integration

Despite optimism regarding AI's potential for enhancing sustainability within companies' development teams, there remains concern about producing products that perfectly meet customer desires at optimal times via appropriate platforms—potentially leading to overconsumption. For instance, "the customer may find it lovely that she buys it but doesn't wear it... Customers may keep seeing great things [and] would give an exaggerated signal of an ideal situation: this is what I need but would never wear" (Personal communication, February 14, 2025).

Interviewees from retail-related fields expressed hesitation about adopting AI due to fears about its impact on employment stability: Ind_04 noted apprehension stating: "I am afraid of AI [and] afraid of the future" (Personal communication, January 23, 2025). Ind_12 highlighted

concerns regarding automation replacing human roles: "DeepSeek reaches a critical point. Now AI can replace us. Many industries will be replaced" (Personal communication, February 14, 2025). To mitigate these risks through future-proofing strategies involves identifying core creativity as a competitive advantage for companies aiming not to fall behind if they do not adopt quickly enough.

The Bright Side: Long-Term Vision and Opportunities Enabled by AI

AI also presents a bright future unlocking many possibilities. Ind_09 referenced a 2019 article where Levi's CEO envisioned a tech-integrated experience using AI, facial recognition, and customer data to personalize shopping (Petro, 2019). Upon entering a store, the system would recognize customers (with consent), access their purchase history, and suggest tailored products. Virtual prototypes (e.g., AR try-ons) could replace physical inventory, with items shipped directly to customers, reducing in-store inventory costs and merging online convenience with in-person engagement (Personal communication, January 22, 2025). The argument was that brick-and-mortar stores would remain relevant but must evolve, focusing on emotional connections uniquely fostered in physical stores.

Another possibility lies in the supply chain. Ind_07 shared a vision of an AI-enabled sustainable world where millions of user reviews on digital platforms are leveraged to identify the properties of the perfect fabric (Personal communication, January 23, 2025). This future involves reverse-engineering to create this fabric from waste materials or creating a closed loop with textile-to-textile recycling. As Ind_07 noted, "AI can save the day, and it takes some radical shift in thinking" (Personal communication, January 23, 2025).

The common thread between these visions is the importance of emotional connections and the human touch, which AI could help amplify and preserve while pursuing a more sustainable future for the fashion industry. While technology continues to advance rapidly, successful implementation will require maintaining a delicate balance between automation and personal interaction. This means designing AI systems that enhance rather than replace human relationships, ensuring that technological innovations serve to strengthen the emotional bonds between brands and their customers. The key lies in viewing AI not as a replacement for human interaction, but as a tool to create more meaningful and personalized experiences that celebrate the irreplaceable value of human connection.

11.5 Conclusion and Recommendations

This study explored the multifaceted role of AI in driving sustainability within the fashion industry, addressing three key research questions: (1) current applications of AI, (2) near-term opportunities and challenges, and (3) long-term visions and risks. The findings reveal that AI is actively deployed across multiple domains, from supply chain optimization and sustainable design to customer engagement and waste reduction. Near-term opportunities include enhanced operational efficiency, personalized customer experiences, and improved resource management. However, challenges such as the potential for overconsumption, job displacement, and ethical concerns related to data privacy and algorithmic bias must be carefully addressed.

While the interviews provided valuable insights into current applications and near-term opportunities, exploring longer-term visions and risks proved more challenging. Many interviewees expressed optimism about AI's potential but had not thoroughly considered the long-term implications. This highlights a critical need for proactive and strategic planning to mitigate potential negative consequences and ensure that AI is used responsibly to promote sustainable practices.

11.5.1 Strategic Recommendations

To harness AI's potential for accelerating sustainability in the fashion industry, the following recommendations are proposed:

Every brand plays a role: As noted by Ind_01, sustainability requires contributions from every player in the industry (Personal Communication, January 27, 2025). For instance, while Muji may excel in cotton sourcing, H&M may lead in take-back programs. It is essential to democratize and encourage widespread adoption of AI-driven sustainability initiatives across all fashion brands, regardless of size or market segment. This can be facilitated through industry collaborations, knowledge sharing, and the development of open-source AI tools and resources.

Be the first but not the only: According to Ind_08, Lululemon strives to be a pioneer in investing in innovation without needing to be the exclusive owner of the technology (Personal Communication, January 23, 2025). For example, Lululemon invests in developing textile-to-textile recycling with Samsara and encourages other brands to benefit from this initiative. The aim is to share knowledge with industry players and scale the impact.

Harness data to preserve the human touch: As advised by Ind_07, it is crucial to leverage AI to analyse vast amounts of data for personalizing customer experiences and optimizing supply chain operations while prioritizing the human touch (Personal Communication, January 23, 2025).

11.5.2 Limitations

This study has several limitations that should be considered when interpreting its findings. First, the research is based on a single case study, which limits the generalizability of the results. Future research should include multiple case studies across different types of fashion brands to provide a more comprehensive understanding of AI's impact on sustainability. Second, data were collected through semi-structured interviews that may be subject to response bias. Although efforts were made to ensure confidentiality and encourage honest responses, participants may have hesitated to express negative views about AI or fully disclose potential risks. Third, this study primarily focused on the perspectives of executives within the fashion industry. Future research should incorporate views from other stakeholders such as consumers, employees, and policymakers to provide a more holistic perspective.

11.5.3 Future Research

To build upon the findings of this study and address the identified limitations, future research should focus on the following areas:

Longitudinal studies: Conduct longitudinal studies to track the long-term impacts of AI implementation on environmental and social outcomes in the fashion industry. This will provide valuable insights into the effectiveness of AI-driven sustainability initiatives and help identify any unintended consequences.

Ethical frameworks: Develop comprehensive ethical frameworks for the development and deployment of AI in the fashion industry. These frameworks should address issues such as data privacy, algorithmic bias, and labour displacement, and should be developed in consultation with diverse stakeholders.

Consumer behaviour: Investigate the impact of AI-driven personalization on consumer behaviour and its implications for sustainable consumption. This will help identify strategies to encourage responsible purchasing decisions and reduce overconsumption.

These research directions will contribute to a more sophisticated understanding of AI's potential in driving sustainable transformation within the fashion industry. The integration of AI in fashion sustainability requires careful consideration of human factors, maintaining equilibrium between technological advancement and personal interaction that consumers value (Rathore, 2019). While AI presents significant opportunities for advancing sustainability initiatives in the fashion industry, maintaining human-centric approaches remains paramount for ensuring meaningful connections with consumers, fostering trust, and creating lasting positive impact in the fashion ecosystem.

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