ARTIFICIAL INTELLIGENCE IN APPAREL : A U.S. RETAIL SECTOR ANALYSIS

Growth Internship Task

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US Apparel Retail + AI

The U.S. apparel retail market, valued at approximately $365.7 billion in 2025, remains one of the most mature and competitive sectors globally and continues to grow steadily. In such a dynamic space, retailers are increasingly turning to artificial intelligence (AI) to gain operational efficiency, enhance customer experiences, and make faster, more data-driven decisions.

AI agents—autonomous systems capable of perceiving their environment, processing data, and making real-time decisions—are being deployed at scale across both front-end and back-end operations. On the customer-facing side, AI powers chatbots, virtual stylists, visual search engines, and personalised recommendation systems, all aiming to enhance the online and in-store shopping experience. According to McKinsey, apparel retailers that implement personalisation strategies through AI can increase revenues by 10% to 20% while improving customer satisfaction and retention.

On the operational side, AI is critical in demand forecasting, inventory optimisation, price automation, and supply chain management. AI systems can significantly reduce overstock and markdown losses by leveraging historical data, real-time sales insights, and external variables (e.g., weather, events, trends). For example, companies using AI-driven inventory tools have reported up to a 30% reduction in inventory costs and a 50% improvement in forecasting accuracy (BCG, 2024).

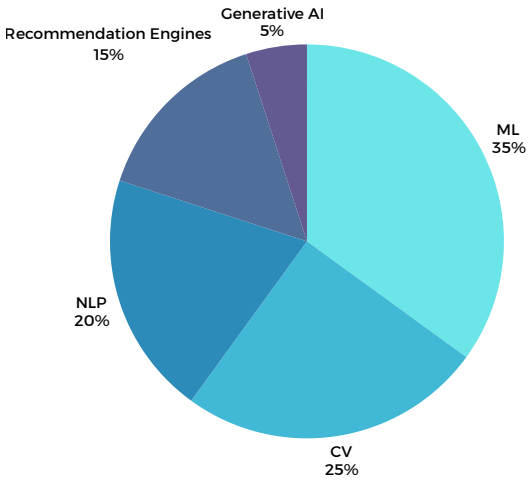
In this report, we explore the specific use cases of AI in the U.S. apparel sector, analyse its integration into key business components, and examine the leading companies shaping the future of retail through AI innovation.

$355,700,000,000	US Apparel market size in 2024 →
$2,190,000,000	Global AI in fashion market in 2024 →
$1,260,000,000	U.S. AI in Fashion Market in 2024 →
40.4%	compound annual growth rate →

Component Analysis

component	AI application example	US Retailer example
Customer Experience	Chatbots, fit tools, styling assistants	Macy's, Levi's
Merchandising	Trend forecasting, visual AI tagging	Nordstrom, H&M
Inventory & Fulfillment	Demand prediction, warehouse automation	Gap Inc., AEO
Marketing & Engagement	Personalized emails, promotions, cross-sells	Stitch Fix, REI
Product Development	AI-assisted design, demand validation	Nike

Technology Analysis



AI in apparel retail is driven by a mix of various technologies. They are integrated through cloud infrastructure, APIs, and increasingly, in-house AI platforms developed by retailers themselves.

Machine Learning (ML) is used for demand forecasting, dynamic pricing, and customer segmentation. For example, Stitch Fix uses data from customer surveys to return patterns and recommend curated outfits for users.

Computer Vision (CV) powers virtual try-ons and size detection tools. Nike Fit uses CV through a smartphone camera to recommend shoe sizes with 98% accuracy.

Natural Language Processing (NLP) underpins AI chatbots, product search, and review analysis. Retailers like Macy'sand Dick's Sporting Goods use NLP-powered assistants to interpret customer queries, guide product selection, and even resolve post-purchase concerns all without human intervention.

Cloud-based AI Platforms are commonly used by mid-size retailers that don't have in-house AI teams. Solutions from Google Cloud Retail AI and Amazon Personalise offer pre-built models that can be plugged into e-commerce platforms to deliver personalisation and trend detection capabilities.

Application Analysis: Key AI Use Cases

→ Personalized Fit and Style Recommendations

One of the most widespread applications is personalised fit and style advice. Companies like True Fit have partnered with major retailers, including Walmart and Nordstrom, to help customers find better-fitting clothes using machine learning models trained on size charts, return data, and customer profiles. Similarly, Nike's "Nike Fit" tool leverages smartphone-based computer vision to scan a user's foot and recommend the best size across Nike's product lines. This has reportedly reduced size-related returns by more than 20%.

These tools don't just solve a logistical challenge—they also improve conversion rates. McKinsey estimates that AI-driven personalisation can lead to a 10–15% increase in online sales for apparel retailers, especially among repeat buyers.

→ Emotion AI for In-Store Experience Analysis

Emotion AI uses computer vision to interpret facial expressions and gauge how shoppers feel in-store. This is a crossover of neuroscience, computer vision, and retail design. Companies like Affectiva and Neurotrend have helped retailers adjust layouts, lighting, and product displays based on emotional feedback. In one case, layout changes based on emotion tracking led to a 9% increase in dwell time. This technology gives brick-and-mortar brands like Macy's a data-driven way to enhance the in-store experience, something previously hard to measure.

→ AI-Driven Virtual Try-Ons and Styling Tools

U.S. retailers are increasingly deploying AI-powered virtual try-on technologies that use augmented reality and deep learning to simulate how clothing items look on a user. For instance, Kohl's has partnered with Snapchat to allow customers to virtually try on outfits using AR filters, which significantly increased engagement during the 2023 holiday season.

Meanwhile, Levi's piloted an AI-powered styling assistant that not only recommends clothing based on body type and gender but also considers contextual factors such as season, occasion, and even local climate data. These tools help improve product confidence and reduce cart abandonment—two major challenges in online apparel shopping.

Visual Search and Product Discovery

Visual search is a rapidly growing use case in U.S. apparel retail, especially among Gen Z shoppers who prefer browsing by image over text. AI-powered visual search allows users to upload a photo, such as a celebrity outfit or a social media screenshot, and receive instant product matches or similar styles from the retailer's catalogue. This uplifts discoverability and reduces friction in the product discovery process. For example, ASOS U.S. implemented visual search in its mobile app, enabling users to upload style images and browse visually matched products. According to internal A/B tests, the feature increased engagement by 8–10% and drove higher conversion on mobile.

AI-Powered Resale and Circular Fashion Automation

As resale booms in the U.S., retailers use AI to scale operations. Platforms like thredUP use AI to sort, grade, and price over 100,000 items daily, reducing manual work and improving accuracy. Brands like Levi's and Patagonia have launched resale programs powered by AI to support sustainability while cutting costs. These tools allow retailers to tap into the growing demand for circular fashion while staying operationally efficient.

Inventory Optimization and Demand Forecasting

AI agents have significant backend applications, particularly in inventory and supply chain optimization. Ralph Lauren, for example, uses machine learning to analyze historical sales, event calendars, and weather data to predict demand at the store level. This enables smarter purchasing and restocking decisions, which is especially important in an industry where overproduction leads to costly markdowns. In a 2022 pilot, American Eagle Outfitters used AI to consolidate regional inventory data and automate transfers between nearby stores. The result was a 17% improvement in fulfilment speed and a noticeable drop in out-of-stock incidents for fast-moving items.

AI-Driven Customer Support and Chatbots

AI-powered chatbots are standard across major U.S. apparel websites, helping brands deliver 24/7 support without overloading human teams. These chatbots handle everything from order tracking to size guidance and returns, often escalating only complex queries to human agents. During high-traffic periods such as holiday sales, this automation becomes essential. Levi's deployed a chatbot that handles up to 60% of incoming queries, improving response time and customer satisfaction while freeing staff for high-value tasks. As natural language processing improves, chatbots are also starting to guide purchases, making them both a service tool and a revenue driver.

Synthetic Models and AI-Generated Fashion Campaigns

Retailers increasingly use AI to generate synthetic models—virtual humans created by algorithms—to showcase apparel in marketing campaigns or e-commerce listings. Without photoshoots, these models can be generated in diverse body types, ethnicities, and poses. U.S.-based retailers like Calvin Klein and Zara U.S. have experimented with synthetic models in digital ads, while platforms like Vue.ai offer tools to create AI-generated model imagery at scale. This saves time, lowers content production costs, and helps brands personalize visuals for different audience segments. In a 2023 pilot, AI-generated models cut campaign turnaround time by over 60% and increased ad engagement rates due to better visual diversity.

Automated Product Tagging and Merchandising

AAs apparel catalogues expand rapidly, especially for fast fashion and resale, manually tagging products with all the details becomes time-consuming and error-prone. AI solves this through visual tagging and metadata generation. Startups like Vue.ai provide U.S. retailers like thredUP and Macy’s with auto-tagging tools that use computer vision to extract product attributes and apply them consistently across listings. This saves up to 80% in manual tagging time and improves SEO, product discoverability, and recommendation engine performance, which is especially important for retailers with dynamic inventories.

Cashier Free stores

AI also enables cashier-free shopping experiences, making checkout faster and more seamless for customers. These systems eliminate the need for traditional billing counters. Companies like Zippin and Standard AI have partnered with apparel and mixed-retail brands to pilot such technology in select locations. Early tests in urban pop-up stores showed a 30–40% reduction in checkout-related friction, with higher customer satisfaction scores than traditional POS systems. Cashier-free AI solutions present a promising shift toward more innovative, frictionless retail environments for high-volume or experience-led apparel stores.

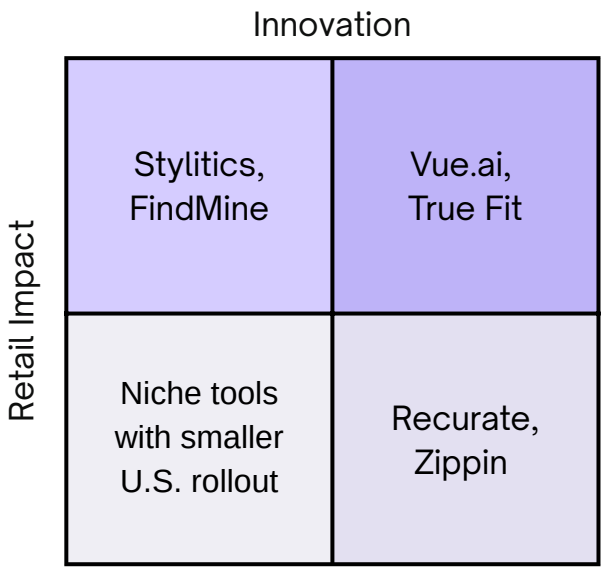
AI-Powered Custom Design Tool

H&M's Creator Studio platform uses AI to enable users to create custom clothing designs. Utilizing generative AI models, the tool allows users to generate visual artworks based on text inputs, which can then be applied to garments. This democratizes the design process, enabling anyone to become a designer without prior artistic skills.

Leading AI Vendors

Company	What they do?	Notable Clients	Impacts
Vue.ai	Auto-tagging, personalization	Macy's, thredUP	+15–20% conversions
True Fit	Fit prediction engine	Nordstrom, Gap	-25% returns
Stylitics	Outfit bundling / styling AI	Bloomingdale's, Express	+10–12% AOV
FindMine	AI-powered "complete the look"	Adidas, Perry Ellis	+20% UPT
Recurate	Resale automation + circular tools	Steve Madden, Eileen Fisher	Streamlined resale at scale
LivePerson	AI chat and messaging	Levi's, The North Face	60–70% of queries handled
Zippin	Cashier-free checkout	Retail pilots in apparel	-30% checkout friction

A growing ecosystem of AI startups is transforming the U.S. apparel retail landscape by offering scalable, specialised solutions. These companies are helping retailers streamline everything from product discovery and fit prediction to styling, resale automation, and even cashier-free store operations. They deliver personalised experiences, innovation in sustainability and in-store technology. As adoption grows, these vendors become key enablers of digital transformation in established retail chains and emerging fashion players.



Success Story: Macy's – AI to Bridge Online and Offline

Macy's, an omnichannel retailer with over 500 department stores across the United States, is a leading example of how traditional U.S. retailers adopt AI to stay competitive in a changing retail landscape. Over the past few years, Macy's has quietly embedded AI across its core operations, from product discovery and customer support to markdown pricing and inventory decisions.

AI-powered style search

On the customer front, Macy's launched an AI-powered style search tool in its U.S. mobile app in 2023. Built using NLP and visual AI, users can type in phrases like "casual fall outfit under $100" and receive products based on old browsing and purchases.

14% ↑

increase in mobile session engagement

8% ↑

lift in conversions

30% ↑

online store share in total revenue

product tagging and visual recommendations

Macy partnered with Vue.ai to automate product tagging and visual recommendations. With thousands of SKUs added each month, automating metadata generation saves Macy's significant time and improves on-site navigation and cross-sell accuracy especially for its online store.

Dynamic Pricing and markdown Optimization

Behind the scenes, Macy's uses AI for dynamic pricing and markdown optimization, leveraging historical sales data, real-time inventory levels, and regional trends to time its price reductions strategically. In a Q4 2023 trial across several East Coast stores, AI-driven markdowns outperformed manual pricing by 7% in sell-through rate, helping Macy's move seasonal inventory more efficiently without deep discounting.

Macy's On Call

On the in-store side, Macy's has piloted "Macy's On Call," a chatbot powered by IBM Watson, in select U.S. locations. It helps shoppers find departments, check inventory, or access promotions, creating a seamless bridge between digital and physical shopping.

Success Story: Stitch Fix – AI at the Core

Stitch Fix, a U.S.-based online-only apparel retailer, has built its entire business model around AI. Operating across the U.S. with over 3 million active clients, the company delivers personalised clothing “Fixes” curated by a hybrid system of algorithms and human stylists. Here’s a step-by-step explanation of the Stitch Fix customer flow; AI is being used at each step to optimise sales and production.

Onboarding – Style Profile Quiz ↓

Algorithm-Generated Item Selection ↓

Human Stylist Final Review ↓

Box Delivery and Try-On at Home ↓

Feedback and Returns ↓

Trend & Inventory Planning ↓

Recommendation engine

At the heart of Stitch Fix’s success is its recommendation engine, which uses over 85 data points per customer, including size, style preferences, climate, body shape, and lifestyle habits. This data is analysed using ML models to generate personalised outfit suggestions. Once the AI ranks potential items for each customer, a human stylist reviews and finalises the selection. According to Stitch Fix’s 2022 annual report, over 80% of algorithm-selected pieces are sent without changes, indicating high accuracy and trust in the system. The company also uses unsupervised learning to identify emerging fashion trends from data, allowing it to pre-order inventory based on predicted demand.

Inventory and Pricing

Additionally, Stitch Fix applies AI to manage its inventory and pricing dynamically. Demand forecasting models help align inventory with shifting consumer behaviour, reducing overstock and optimising warehouse logistics. The company also tests AI-generated copywriting tools for personalised product descriptions, helping tailor the online shopping experience without increasing operational workload. By building its business on AI, Stitch Fix has influenced larger players like Nordstrom to adopt more algorithmic styling and personalised outreach tools.

Success Story: American Eagle – AI for Store Efficiency

American Eagle Outfitters (AEO), a brick-and-mortar retailer that operates over 880 stores across the United States, has adopted a targeted and pragmatic AI strategy focused primarily on improving in-store execution, inventory flow, and operational efficiency. Unlike digital-first brands, AEO's AI efforts emphasise backend optimisation that directly supports its physical retail network while enhancing customer satisfaction.

Collab with Blue Yonder

One of the most impactful implementations has been in demand forecasting and inventory optimisation, where it uses ML models to analyse past sales, regional trends, and real-time traffic data. In collaboration with Blue Yonder, a retail AI platform, AEO launched a system that predicts store-level demand for key categories like denim and activewear. This allowed the company to optimise warehouse-to-store transfers and adjust stock levels weekly instead of seasonally. As a result, AEO reported a noticeable reduction in out-of-stock rates across high-performing locations during the 2022 back-to-school season.

In-store AI Tools

The company also leverages AI-powered workforce scheduling, using predictive analytics to align staffing with expected foot traffic and transaction volumes. This has helped store managers reduce overstaffing and labour shortages, especially in malls and outlets with fluctuating visitor patterns. In addition, AEO is investing in CV tools. These systems track how shoppers move through the store and interact with displays, offering insights on product placement, bottlenecks, and underperforming zones. Though still in early phases, improving layout efficiency and customer engagement.

17% ↑

Improvement in fulfillment speed

8% ↑

improvement in labor productivity

12% ↑

reduction in out-of-stock incidents

10% ↑

improvement in inventory turnover ratio in test regions

Opportunities

1. **Personalised experiences that directly impact sales**: Personalisation is one of the clearest wins for AI in apparel. It allows brands to customise the shopping experience at scale. Companies like Stitch Fix have built their entire business around this, while Macy's reports higher conversion rates from their AI-powered style search. McKinsey estimates that personalisation could unlock up to $450 billion in retail revenue, with apparel being a key driver.
2. **Smarter inventory and fewer stockouts**: Inventory mismatches are a massive drain for apparel retailers. AI can help solve that by predicting what will sell, where, and when. AEO, for example, has seen a 17% improvement in fulfilment speed after deploying AI-based demand forecasting.
3. **Entry into resale and circular models:** With more consumers, especially Gen Z, looking for sustainable options, resale is becoming a growth area. AI makes the operations simpler. Platforms like thredUP and Levi's SecondHand generate revenue using AI to sort, price, and list secondhand items efficiently, allowing brands to scale circular commerce without much manual effort.
4. **More efficient marketing spend**: AI enables brands to target customers more precisely, test messaging faster, and predict what will lead to conversion. This reduces wasted ad spend and improves return on marketing investment. This kind of efficiency is critical for mid-sized brands that can't compete on budget alone.

Challenges

1. **Data is still fragmented, and often incomplete:** AI is only as good as the data it learns from. Many U.S. apparel brands still have siloed systems: one for stores, another for e-commerce, and yet another for loyalty programs. That makes it hard to build a full picture of the customer, which weakens the accuracy of AI tools.
2. **AI still requires upfront investment:** While off-the-shelf tools are improving, implementing AI at scale, especially customised solutions, requires budget, integration, and often specialised talent**.** According to NRF, 43% of mid-sized U.S. apparel retailers have delayed AI projects due to cost or lack of internal resources. These brands don't find it feasible enough.
3. **The privacy question is growing**: As AI systems become more data-hungry, so do consumer expectations around privacy. With regulations like CCPA already in effect, U.S. retailers, especially Gen Z, must balance using data to personalise and respecting boundaries.
4. **Bias in AI models can hurt more than help**: AI that hasn't been trained on diverse body types, skin tones, or style preferences can lead to irrelevant or exclusionary recommendations. Companies like Levi's proactively address this by building inclusive datasets and testing AI models across more representative profiles.

Conclusion

Artificial intelligence is no longer a “nice-to-have” in U.S. apparel retail—it’s becoming core to how brands operate, grow, and compete. What makes this shift meaningful is the technology itself and where and how it’s being applied. From when a customer visits a brand’s website to when an item is returned or resold, AI is quietly driving key decisions and improving performance across the board.

At the front end, AI powers personalised discovery, more intelligent search and recommendations, and precise fit prediction. Stitch Fix has built an entire business on using AI to curate outfits, while Macy’s uses natural language search and product tagging to guide online shoppers more effectively. In-store technologies like emotion recognition, computer vision, and cashier-less checkout are reshaping how customers navigate physical spaces, reducing friction and optimising layouts.

Behind the scenes, AI is driving operational precision. American Eagle has used machine learning to optimise store-level inventory and reduce out-of-stock rates by double digits. Macy’s applies AI to markdown timing and pricing decisions to boost sell-through. And Levi’s shows how generative AI and resale automation can drive sustainability while cutting costs. Together, these applications span the whole value chain. The opportunity now isn’t just to “use AI” but to apply it where it solves real, measurable problems—faster fulfilment, lower returns, higher conversions, better loyalty. Retailers that take a focused, problem-solving approach will reduce operational drag and build deeper, more responsive customer relationships.

AI isn’t just a technology investment. It’s a strategic enabler

→ 2018-2020	Fit engines, chatbots
→ 2020-2023	Personalization, product tagging, dynamic pricing
→ 2024-2025	Generative AI, cashierless, resale automation