

# **Integration of Artificial Intelligence & Its Practices in Apparel Industry**

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## **Abstract**

AI is being used by manufacturers to automate production processes and reduce the risk of errors. AI-powered robots and machines are being used to increase accuracy, reduce the number of labour hours and even predict when a machine is likely to fail -- thus helping to reduce downtime of the production machines. AI can also be used in the fashion and apparel industry to improve product design and optimize the production process. AI can identify important variables, such as trends and preferences, that can be used for designing better products, based on the customers' feedback. AI-powered robots can help identify flaws in materials, streamline production, and improve quality and consistency. AI can also be used to improve the customer experience. For example, AI-powered virtual assistants can help recommend clothing and accessories that best match customers' tastes and preferences. AI can also provide customers with detailed recommendations on which ones will fit the best and suggest ways to accessorize the products. AI-powered devices can also be used to detect customers' gestures, body shapes and sizes and provide personalized fitting suggestions.

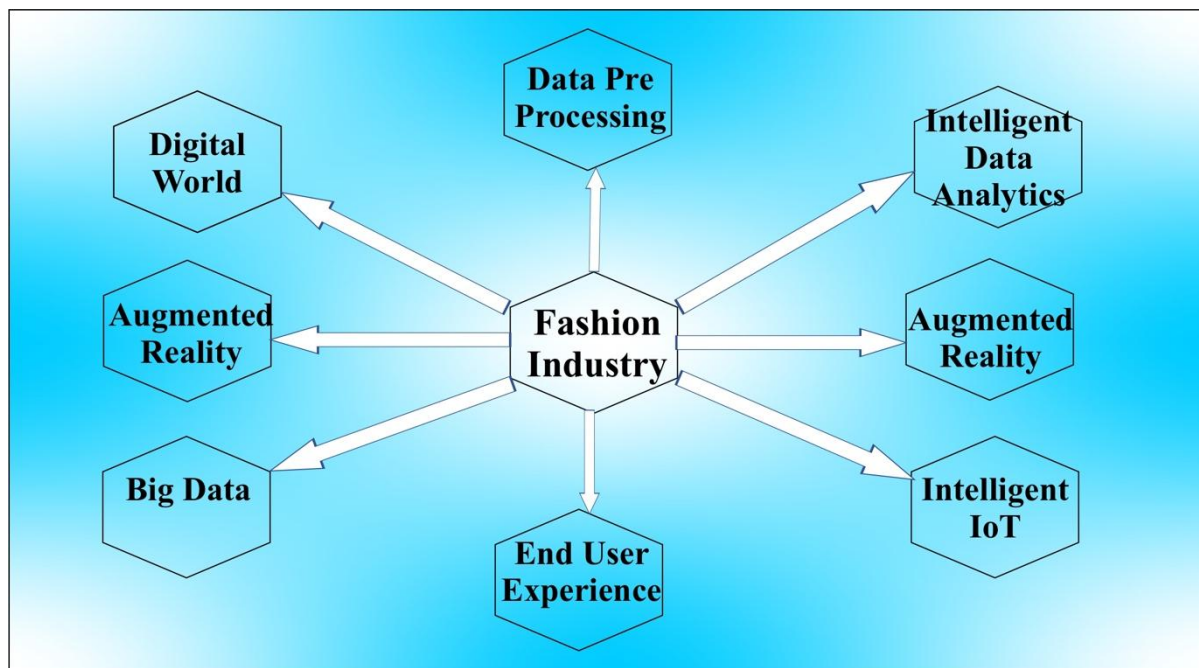
This research proves that AI technology can bring a revolution to the fashion and apparel industry. AI has considerable potential to reduce labour time and costs, automate processes, improve quality, optimize designs and increase customer service. The future of fashion looks much brighter with the use of AI technology. Starting from the development trend of artificial intelligence, analysis of various aspects of artificial intelligence in fashion. It analyses the feasibility of artificial intelligence and predicts various decisions through 'MESN Model' in fashion industry.

**Keywords:** Artificial Intelligence, Fashion Industry, Apparel Industry, MESN Model, Automate Processes, Garment Manufacturing, Supply Chain

## **Introduction**

In terms of investment, revenue, trade, and job creation, fashion industry is one of the most crucial sector across the globe which is highly segmented and produces varied range of fashion products. To keep up with this rapid and dynamic change, brands must have agile supply chain systems to satisfy customer needs. Therefore, AI is becoming an invaluable tool in the garment industry as it can greatly help with real-time predictive analysis, create smarter product assessments and monitoring, and optimize the supply chain. For example, AI can use big data to increase the speed of product design and allow for dynamic forecasting to predict customer demand. Apply AI to monitor inventory levels, analyze patterns in customer data, and create more rapid and efficient production processes.

In conclusion, through AI the efficiency and productivity of fashion businesses can be increased and the industry can remain competitive. The use of AI can provide garment manufacturers and retailers with a wide range of advantages, such as increased efficiency, higher quality, and cost savings. AI can also be used to personalize the customer experience by providing more targeted product recommendations and providing a more detailed product description. Overall, AI can make a significant contribution to the garment industry by improving efficiency, customer experience, and product quality. It has the potential to drastically reduce the cost of manufacturing and increase customer satisfaction. AI technology can play a critical role in the success of many fashion and apparel businesses [1].



**Figure 1. Artificial Intelligence Integration in Fashion Industry**

Artificial intelligence (AI) is transforming the way F&A businesses are carried out. AI-driven technologies help to automate processes, creating faster and more efficient operations, improved product design, and better customer service. AI can also provide businesses with accurate customer insights, allowing them to gain better understanding of customer preferences and offer tailored products and services. AI can be used to automate production processes, optimize designs, predict customer demand, and improve supply chain visibility. AI-enabled technologies such as natural language processing and computer vision can be used to create virtual assistants that can help customers find the right fit and style [2]. AI-driven analytics can also help to identify customer trends and preferences, allowing companies to adjust their products and services accordingly. In conclusion, AI is a powerful tool that can be used to revolutionize the F&A industry. AI-driven technologies can help businesses to provide faster, more efficient, and cost-effective operations. AI also helps businesses to gain customer insights and provide tailored products and services [3]. AI technology is sure to help the F&A industry to stay ahead in the future.

As technology is evolving, Artificial Intelligence (AI) has started to become an integral part in the fashion industry. By revolutionizing the production and product delivery processes, AI enables fashion companies to create better customer experiences, faster production cycles, improved product performance and quality, cost reduction, and better optimization of the supply chain. AI can be used to automate processes such as pattern recognition, to identify flaws or inconsistencies in fabrics or apparel,

and to recommend products and services to customers. AI can also be used to improve customer experience, by identifying patterns in consumer behaviour and providing insights. Moreover, AI can help fashion companies make the most of the data they collect from customers, such as preferences and trend to make design and production decisions [4]. AI can even be used to create virtual fitting rooms that can provide customers with detailed advice on what apparel will fit them best and accessorize them. AI technology has proven to be an essential tool for the fashion industry. AI can improve the customer experience, automate processes, improve product design and performance and reduce costs. The combination of AI and fashion has the potential to revolutionize the industry and create more opportunities for fashion companies to succeed. AI has been applied to the fashion and apparel industry. AI-powered solutions are capable of generating predictive insights about fashion trends and customer preferences. Due to its ability to solve problems with conventional mathematical models. It is no different in the fashion and apparel industry [5]. AI-powered solutions can provide predictive insights about fashion trends and customer preferences.

AI has become famous as a means of connecting businesses around the world. AI has become an integral part of our lives in various ways such as in the form of automated customer support, automated customer service, predictive analytics, search engine optimizations, and many more. AI has been used to help businesses create more efficient customer support systems, process large amounts of data quickly, and increase their overall operational efficiency. AI-enabled solutions can also be used to

save time and money on routine tasks such as data entry and analysis, which can reduce human labour costs significantly [6]. Furthermore, AI-powered systems can be used to identify customer needs and preferences for businesses, allowing them to offer personalized services that build customer loyalty. AI is here to stay, and its impact on businesses will continue to grow, as it can provide more efficient and accurate decisions while also delivering improved customer experience [7].

Many companies have implemented AI in their manufacturing/operations processes to increase accuracy and automation of various activities. AI-powered analytics boast potential in predictive management, forecasting, and decision making with AI-enabled forecasting. AI is becoming increasingly important to businesses and will continue to shape the future of fashion industry [8]. It has immense potential to revolutionize the way organizations operate, manage their operations, improve customer experience, and control costs. Though there is still a huge potential for further integration of AI, it is clear that AI will continue to play an important role in the manufacturing/operations in the near future. It is really significant because the fashion industry is volatile, and it seems difficult to respond quickly to changes as per latest trends and continuously evolving consumer demands [9].

With the utilization of AI, companies can modify personalized marketing and product experiences that target potential customers and satisfy existing customers. Companies can invest in AI tools to understand customers' buying behaviour and

interests. AI-enabled systems can give businesses powerful insights into customer preferences and enable them to serve them better and faster [10]. Also, through AI-driven technologies, companies can predict customer's behaviour better and create tailored promotional campaigns and target them more effectively. Some AI tools include natural language processing, facial recognition, voice recognition, etc. All of these technologies can be used individually or in conjunction to maximize customer engagement and satisfaction [11]. Furthermore, AI powered data analytics can also help companies optimize their business practices such as pricing, segmenting customers, and product placement. In conclusion, AI is undoubtedly becoming an invaluable tool for businesses across all industries in today's time, and is being adopted by companies rapidly. AI has the potential to not only help companies serve their customers better and connect with them on a personal level, but also help them drive their sales and profits. To make investments in this technology carefully and strategically, many companies can stay ahead of their competition and maximize their customer satisfaction [12].

### Conceptualization of AI in Fashion Industry

From concept to consumer, fashion product majorly involves five vital processes: Conceptualization, Designing, Manufacturing, Supply Chain and End User.

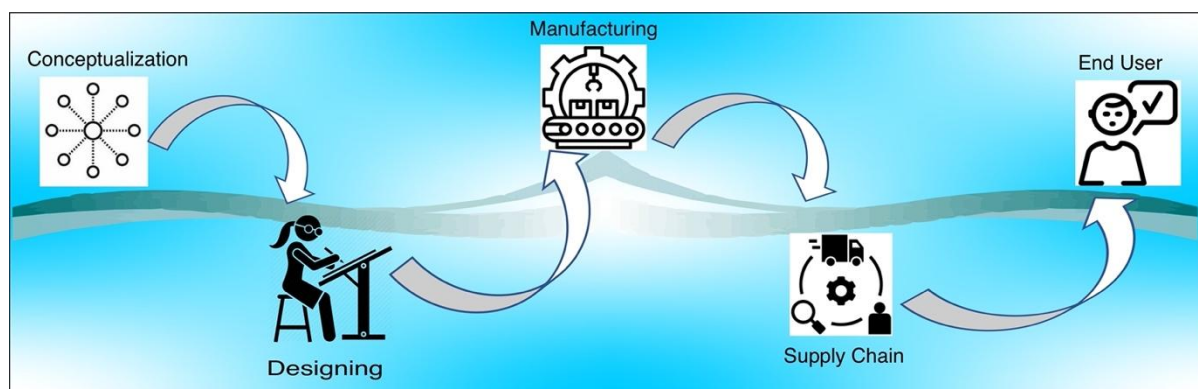


Figure 2. Five Vital Processes of AI in Fashion Industry

AI currently plays a major part in each of these stages. At the concept and design stage AI enables companies to predict the trends and styles which have high demand and low cost. Companies are able to create and test prototypes rapidly through AI designed technology [13].

At the design phase, AI algorithms can be used to predict trends and styles that have the highest

demand and to control costs. AI tools can also help designers create and test prototypes rapidly. In the manufacturing phase, AI-driven systems can be used to monitor production line performance, track inventory levels, and optimize end-to-end supply chain networks. AI can also be used for quality assurance as AI-based image recognition technologies can identify flaws and defects in fabrics and apparel products quickly. At the end user phase, AI algorithms can be used to analyze product data, analyze customer behaviour and buying patterns, and personalize customer experiences [14]. Furthermore,

AI-enabled chatbots can provide customer service, reduce wait times and offer helpful advice. AI plays an important role in the apparel industry by helping companies create, produce, and market products more effectively, efficiently, and quickly. AI-enabled systems can help companies reduce costs and offer products that are tailored to customer requirements [15].

In the supply chain stage, AI-driven systems can be used to monitor production line performance, track inventory levels and optimise end to end supply chain networks. AI based technologies like image recognition can quickly identify flaws and defects in fabrics and apparel products to ensure quality assessment. By using AI, companies can create smarter factories, optimise supply chain activities, enhance customer experience and boost growth. Through creating a lot of data AI is also enabling companies to generate insights and make better decisions. Therefore, AI is here to stay and will definitely bring new frontiers to the fashion industry [16].

## **Practices of AI in Fashion Industry**

### **1. Conceptualisation of AI in Fashion**

John McCarthy coined the term “Artificial Intelligence”, as progress in the field had been taking place since the 1940’s. He created a rigorous definition for artificial intelligence that included topics like problem-solving and learning, which had not been commonly associated with AI back then. Since then, our understanding of the subject has evolved and more specific subtopics such as Natural Language Processing, robotics and machine learning have become their own disciplines. Artificial Intelligence (AI) has been used to develop technologies that enable machines to interact and assist humans in a wide range of tasks. Speech recognition allows machines to understand spoken language and translate it into action. Medical diagnosis leverages AI algorithms to diagnose diseases and detect malignant tumours [17]. Autonomous vehicles can navigate without the need for human control, and voice-activated assistance across many platforms has enabled machines to respond in a more natural way to spoken commands. These advances have potentially huge implications for the way people go about their daily lives, from their productivity and safety to the amount of time they can devote to leisure and even family activities [18].

Artificial Intelligence (AI) is a computer system that can detect patterns, learn from them, and make decisions based on that data. AI mimics human cognition by analyzing data collected from a variety of different sources to discover patterns, generate insights and make decisions about how to optimize or act on that data [19]. AI typically utilizes machine

learning techniques to constantly improve its decision-making abilities with every operation it performs. AI algorithms are then able to generate decisions based on the data it has gathered, such as which decision will lead to the greatest amount of success [20].

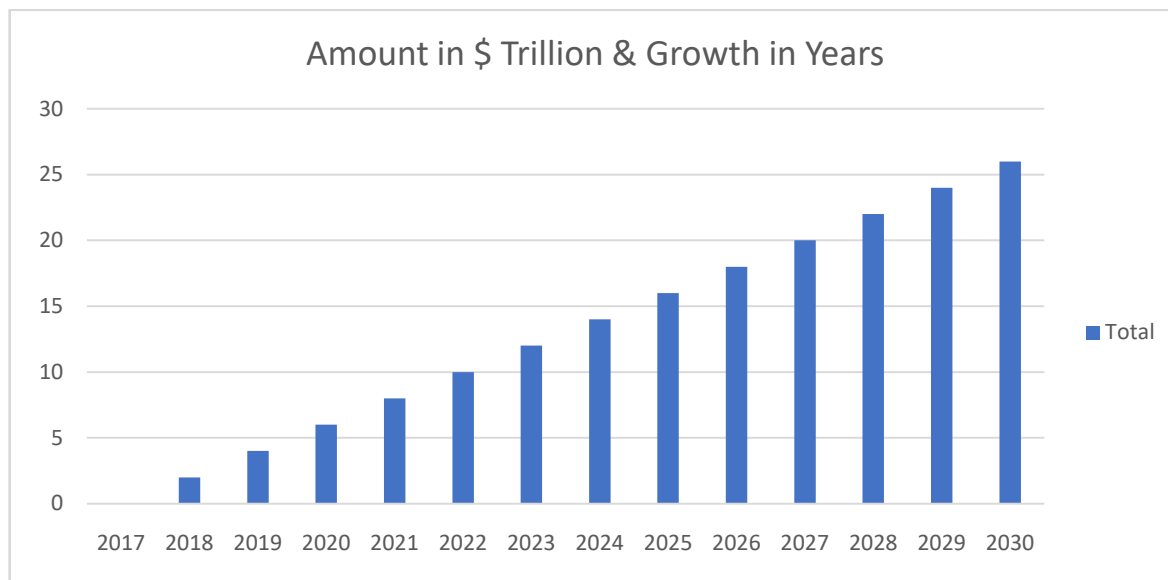
Artificial Intelligence (AI) has become increasingly prevalent in a range of industries. AI has been utilized in healthcare to improve patient care by aiding doctors in diagnosing illnesses and detecting anomalies or symptoms, enable better predictions of patient outcomes and enable doctors to quickly and accurately analyze large amounts of data. AI and machine learning can be used to detect disease patterns, determine appropriate treatments, and prevent medical errors. AI has also been used in the finance sector to improve the efficiency and accuracy of transactions, risk management and financial forecasting and analysis [21]. In addition, AI has made its way into the customer service industry for improved customer service, efficient fraud detection and better customer segmentation. AI and machine learning also have autonomous capabilities that have improved the efficiency of drones and other robots. Finally, AI has been used to optimize the efficiency of transportation, logistics and supply chains [22].

The Internet of Things (IoT) is an interconnected network of physical devices and technologies that enable data to be collected and exchanged between them. IoT is expected to grow exponentially in the coming years, with various reports predicting that there will be approximately 35trillion connected devices by 2030. This network of connected devices will enable the collection of massive amounts of data that can be used to train machine learning and deep learning models [23]. By leveraging IoT’s ability to rapidly and accurately accumulate data, these models will improve in accuracy, precision, and performance. This data can be used for tasks such as text processing, voice recognition, image analytics, and predictive analytics, which will be essential for improving AI algorithms [24]. Additionally, IoT systems allow for a wide variety of devices to interact with one another, creating a greater potential for new experiences and functionality. All in all, the Internet of Things is the necessary technological infrastructure that will enable the further development of Artificial Intelligence [25].

The fashion industry is one of the oldest industries, and the impact of technology has been immense in this area. Artificial Intelligence (AI), automation and cybernetics are playing an increasingly important role in transforming the fashion industry. AI has empowered the industry in areas ranging from customer service to product design. Automation has made production faster, more efficient and cost-effective [25]. Cybernetics has enabled the development of components with multiple functions,

increasing the functionality of clothing while reducing its weight and cost. Additionally, AI and Machine Learning can be used to power personalized recommendations, helping brands better understand their customer's preferences and preferences of potential customers. All of these advances have

enabled the industry to better meet customer needs and accelerate the overall pace of innovation [26].



**Figure 3. AI Contribution in GDP**

Artificial Intelligence (AI) is transforming industries and expanding opportunities for businesses. According to recent research, AI is expected to boost GDP up to 20%, equal to \$16 trillion. Approximately, \$7 trillion will be due to the enhancement in productivity efficiency, and the other \$10 trillion will be the result of consumption-side effects. This will be because AI-powered services and products can reduce costs, improve customer service, and increase efficiency [27]. Due to automation, companies will be able to save costs and time while increasing their ability to customize products or services. AI can also be used to improve sales and marketing strategies and increase profits. Additionally, through AI, consumers will be able to access a personalized service and experience. AI will help to improve the lives of people and businesses worldwide [28].

AI-based applications are increasingly being implemented across many industries, leading to a shift in consumer demand. AI can analyze consumer data points and consumer insights to create data-driven businesses which cater to customers' needs. For example, AI can be used to process customer feedback and personalize offers and experiences in real-time. AI can also be used to analyze customer preferences and generate product recommendations [29]. As a result, businesses are able to deliver products and services that are more tailored to customers' needs. AI is allowing companies to

predict customer behaviour and demand, enabling them to plan ahead and better allocate resources. Additionally, AI-driven customer journey mapping can enhance customer engagement and loyalty. All of these advances are helping to improve customer satisfaction and boost sales [30].

Inventory has always been a major part of the fashion industry. Fashion companies are often faced with the challenge of managing and forecasting the demand for their products due to the unpredictability of customer demand and the rapid changes in the fashion industry. Fashion companies must be agile in responding to trends, as well as have a deep understanding of their customer base [31]. AI and machine learning can be used to analyze customer data and forecast future fashion trends, allowing companies to maintain a current inventory that is tailored to the style preferences of their customers. AI can also be used to optimize supply chain management, reduce inventory costs, and streamline operations. All of these advances can help fashion companies remain competitive in a rapidly changing industry [32].

Inventory management using AI typically starts with using natural language processing (NLP) to analyze customers' purchase histories, returning customer data, and real-time market trends to inform pricing decisions. AI can also help business owners automate inventory-related tasks, such as forecasting by analyzing historical sales data and identifying trends.

Analyzing customer data also helps business owners make better decisions about stocking inventory, ensuring that customers are provided with the most desirable selections [33]. For smaller datasets, AI can be used in a variety of ways, including identifying patterns and correlations in the data, which can be used to create predictive models to inform stock replenishment and inventory forecasting. AI models can also be used to identify customer preferences and generate targeted recommendations to optimize the products offered. Additionally, AI can be used to automate replenishment orders, help with product categorization, and optimize product assortment. AI can also help in predicting customer demand, which can improve the accuracy of stocking decisions [34]. The most common AI-based techniques for sales forecasting include recurrent neural networks (RNNs), long short-term memory (LSTM) networks, and feed-forward models. Recurrent Neural Networks (RNNs) are particularly suited for predicting the future sales of products as they are able to remember previous inputs and produce outputs based on those same inputs. RNNs are composed of layers of neurons that can loop information between them, allowing them to better capture patterns in sales data over time. RNNs can be used to forecast new sales data as well as anticipate changes in seasonality. Long Short-Term Memory (LSTM) Networks are similar to RNNs, but are capable of "remembering" and "forgetting" certain inputs over the course of time, allowing them to better identify seasonal and trend-based changes. LSTMs can be used to anticipate sudden changes in sales, such as when a new product is introduced or when a promotion is run. Feed-Forward Models are neural networks that move data signals in one direction [35]. These models are particularly effective for anticipating changes in future demand based on current trends and seasonality. Feed-forward models can be used to identify historical sales patterns and use them to forecast future sales. Overall, AI-based models can be used to forecast sales effectively and improve the accuracy of stock replenishment and inventory forecasting. By leveraging AI-based models, businesses can better anticipate changes in demand and optimize their product offering [36].

## **2. Designing Via AI in Fashion**

Artificial Intelligence in the fashion industry is becoming increasingly popular. AI algorithms are used to develop fashion collections by analyzing customer data, trends, and preferences. The algorithms can generate creative designs based on the data they receive and use it to create designs that are more in line with current trends. AI algorithms can also create designs based on images, categorizing them according to type and color and suggesting appropriate clothing combinations. AI is also being used to help with product categorization and personalization, featuring custom-made products and

giving customers tailored suggestions to their preferences. Finally, AI is being used for e-commerce and retail applications to automate product recommendations, provide better customer service, and reduce costs. AI has the potential to revolutionize the fashion industry by making fashion more accessible, personalize, and cost-efficient [38]. Yoox is leveraging Artificial Intelligence (AI) to improve customer experience, reduce costs, and offer personalized recommendations. Yoox uses AI to automate product ordering and tracking, optimize product assortment, and provide customers with tailored product recommendations. Yoox also leverages AI to automate price suggestions, which helps ensure that customers are receiving the best deals available. AI is also being used to detect customer trends and preferences, and to improve customer segmentation for targeted marketing campaigns. Finally, Yoox is using AI to detect fraudulent orders and payment transactions, helping to protect customers and the retailer from fraud. By leveraging AI, Yoox is able to deliver better customer service, reduce costs, and provide more personalization.

Using AI, Yoox is able to generate a mood board that represents the latest fashion trends and serves as a starting point for designers. The AI system can also detect changes in customer preferences over time and update the mood board accordingly, helping Yoox stay ahead of the curve and anticipate changes in customer tastes. Additionally, the AI system can analyze customer behavior data and generate product recommendations based on customer preferences, helping customers find the perfect product. Ultimately, by leveraging AI, Yoox is able to provide customers with personalized, up-to-date fashion trends [39].

## **3. Manufacturing Via AI in Fashion**

Fashion items can range from clothing, to accessories, to shoes, and are constantly changing due to seasonality and ever-changing trends and styles. This complexity is compounded by the fact that customers are increasingly turning towards online purchases, making it more difficult for companies to maintain accurate and up-to-date stock and effectively meet customer demand. AI can help to reduce this complexity by providing insight into customer preferences and forecasting demand, enabling companies to accurately anticipate customer needs and stock their inventory accordingly. AI can also automate tasks such as product categorization, managing product assortment and personalizing product recommendations to improve the shopping experience [40].

Production processes in the fashion industry are notoriously long due to the complex manufacturing techniques used to produce the high-quality items in demand. Fashion items require multiple steps from

concept to completion, from sourcing materials and fabrics, to cutting and stitching, to fit and wash. With the proliferation of online retail and constantly shifting trends in demand, these production processes need to be agile and responsive in order to meet customer needs [41]. AI can help to speed up production processes by automating tasks such as ordering, tracking materials, and managing inventory. AI can also provide insights into customer preferences and help to forecast customer demand, enabling companies to accurately anticipate customer needs and better plan their production schedules [42]. A good production system helps ensure that the company is using their resources (raw materials, employees, and equipment) in an efficient manner and meets customer needs. AI can help fashion companies to streamline their production planning, scheduling, and control by automating tasks such as ordering, tracking materials, and managing inventory. AI can also provide insights into customer preferences and help to forecast customer demand, enabling companies to accurately anticipate customer needs and better plan their production schedules. Ultimately, AI can help fashion companies reduce costs, increase efficiency, and better meet customer demand [43].

Automation of garment quality control and inspection helps to reduce costs by eliminating costly manual inspections and minimizing fabric waste due to errors. Automation also helps ensure consistency and accuracy of quality control, with fewer chances of errors in comparison to manual inspections. In addition, automated processes are faster and more efficient, meaning that garments can be inspected quickly with fewer chances of missed deadlines [44]. Automation also eliminates the need of hiring specialized personnel to carry out quality control and inspection, which can save time and resources in the long-term. Automation of this process also allows the use of more sophisticated tools for more accurate analysis and more effective sampling plans. Finally, automation of the process in fashion manufacturing allows for increased traceability, which is critical for garment production as it allows for faster identification of problems and corrective measures [45].

#### **4. Supply Chain Via AI in Fashion**

These technologies which are ready to use and highly adaptable can help organizations keep their product supply lines flexible, efficient, and cost-effective. For example, cloud-based solutions and analytics can be used to collect and analyze data from multiple sources. This data can then be used to develop more tailored supply solutions that are able to meet individual customer needs. Additionally, technologies such as 3D printing, artificial intelligence, and robotics can help organizations automate and streamline production processes, eliminating waste while ensuring quality and

accuracy. Finally, customer feedback can be used to better understand consumer trends and preferences. Organizations can use this data to develop and adjust their supply chains accordingly. By taking advantage of such technologies, organizations can create a more agile and responsive supply chain, which is set to become increasingly vital for the future of commerce [46].

Customised environments and personalised services allow organisations to produce and distribute products tailored to individual customers' needs. These systems and chains enable dynamic alignment of resources to respond to changing conditions quickly and effectively. In order to create an agile and responsive supply chain, organisations must ensure that they have the right systems in place to enable dynamic realigning of resources. This requires organisations to invest in technology such as cloud-based solutions, analytics, and automated processes. Additionally, data collection and analysis should be used to understand customer needs and adjust supply chains accordingly. Furthermore, collaboration between suppliers and customers is essential to make sure that the right products are being produced and delivered. Such collaboration should be based on open, transparent, and reliable communication systems. By adopting these practices, organisations can create high-level customised systems and distribution chains that will enable them to better serve their customers and remain competitive in an ever-changing market [47].

Real-Time Freight and Supply (RTFS) is a more sustainable supply chain and provides customers every information when they are shopping. RTFS creates transparency by allowing customers to view the status of their orders at any time. This makes it easier to monitor the progress of orders and identify any delays, allowing customers to adjust their expectations and save time and money. RTFS also decreases the amount of resources and packaging materials used, as it supports direct ordering from suppliers. This minimizes the amount of stock needed in warehouses, as well as the costs of storage and transport. Additionally, collaboration between supply chain partners is improved and enhanced, helping to reduce transportation costs and improve the efficiency of product and component delivery. By utilizing RTFS, organizations can create a more efficient and sustainable supply chain that provides customers with the information they need when they are shopping, while also helping to reduce waste and save costs [48].

Supply chain traceability is a system that allows organisations to track their products from the source of the raw materials, through all stages of production, to the final consumer. This ensures that the product is safe and meets the standards for quality, safety, and regulation. Additionally, traceability allows

organisations to deliver on-demand, individualised services to their customers. The traceability system can help organisations identify the best suppliers for their products and find the most effective ways of delivering them. Additionally, it can be used to monitor the reliability and traceability of each product and service to ensure accuracy and trustworthiness. By utilizing a traceability system, organisations can streamline their supply chains, improve cost efficiency, and deliver higher-quality services to their customers. This is all optimised by the use of blockchain technology, which provides complete assurance and transparency to customers [49].

Just-in-time (JIT) shipping policies are necessary for an ideal Real-Time Freight and Supply (RTFS) system. Through this, organisations can reduce their inventory levels and transport costs as they only order what is required, when it is required. Just-in-time shipping ensures that orders are placed and received in a timely manner, allowing organisations to deliver on-demand services to their customers. In addition, shipping policies should involve the use of frequent and small lots. Smaller lots are preferred as they help to reduce transportation and inventory costs and enable finite control of quality, as errors can be identified quickly. Pre-ticking and drop shipments should also be used to ensure that all logistics processes from the order placement to the delivery are automatically controlled. Pre-ticking allows customers to request a shipment before it is ready, thus reducing the waiting time. Drop shipments can also help optimise the transit times and reduce logistics costs. By utilising these business practices, organisations can create a more effective and efficient RTFS system and provide higher quality services to their customers [50].

### **5. End User & AI in Fashion**

From last few decades, the crucial luxury and fashion market consumer has seen significant changes in their shopping habits and interactions with brands. As a result of the increased digitalisation and the development of social media, customers have become more aware of their own style and are more informed when making their purchases. Customers are now expecting a personalised shopping experience, tailored to their needs and preferences. This includes allowing them to access personalised product recommendations, virtual styling advice, and flexible payment options. Additionally, customers are expecting more innovative and interactive omnichannel experiences, such as augmented reality and virtual shops. Brands must also be available to customers through multiple channels, both online and offline. To keep up with customer expectations, brands must make sure their products are presented in a visually appealing way and provide the right kind of information that is easy to digest and relevant. Furthermore, brands should ensure that

their customer service team is available to answer questions and provide customers with an enjoyable shopping experience. By adapting to the changing customer needs and habits, luxury and fashion market brands can ensure that they are providing customers with an enjoyable and personalised shopping experience [51].

In current scenario, fashion customers are more diverse than before, making loyal clients a rarity, especially in the luxury industry. As customers become more informed and exposed to a variety of fashion trends, they are more likely to become brand-agnostic and frequently change their preferences. As a result, customers are more likely to look for great discounts and product variety instead of loyalty to a certain brand. To make customers more likely to become loyal to a brand, luxury and fashion brands should provide exceptional services and products. This includes having an excellent customer service team to answer customers' inquiries, as well as providing unique and high-quality products tailored to their customers' needs and preferences [52]. Additionally, luxury and fashion brands should use innovative technologies such as artificial intelligence, virtual reality and augmented reality to personalise the shopping experience for their customers. Furthermore, brands should use loyalty programmes that incentivize customers to make repeat purchases. Such programmes can involve providing discounts on future purchases, exclusive members-only benefits and access to exclusive events and services. By providing the right combination of services, products and incentives, luxury and fashion brands can maintain customer loyalty and build long-lasting relationships with their customers [53].

Luxury and fashion brands want to make sure that their customers have a seamless and enjoyable experience when shopping online. To do this, they must focus on making online customer experience unique and personalized, just as it would be in a physical store. This includes offering personalized product recommendations, tailored promotions, and exclusive content that customers can only get online. Additionally, brands can use data analytics to track customers' shopping habits and preferences, allowing them to create a more tailored shopping experience. Another way to create a personalized experience is to implement interactive features such as chat bots, virtual styling tools, and AR/VR technology. Finally, brands can use social media to foster relationships with customers, allowing them to create a personal connection with their customers that goes beyond just transactions. Overall, luxury and fashion brands must focus on creating a personalized, engaging, and memorable online shopping experience for their customers if they want to gain and maintain a competitive edge in this ever-growing marketplace [54].



The “human touch” of a physical store is an integral part of the customer decision journey, as customers need to feel comfortable and know that they are getting the best service possible. However, this “human touch” is unable to be replicated online and must be replaced with other qualities to make the customer experience smooth and enjoyable. To do this, brands must focus on creating an engaging and personalized online shopping experience. This can involve providing personalized product recommendations, tailored promotions, and exclusive content that customers can only get online. Additionally, brands can use data analytics to track customers’ shopping habits and preferences, allowing them to provide a more tailored experience. They can also implement interactive features such as chat bots, virtual styling tools, and AR/VR technology [55]. Finally, using social media and other digital channels can help foster relationships with customers and create a personal connection with them. Through these methods and more, brands can ensure that online customers still receive attention and a personalized experience, and can gain and maintain a competitive edge in the online marketplace [60].

AI chatbots are being used in both fast fashion and the luxury industry due to their ability to provide a personalized online shopping experience. Chatbots can provide greater efficiency, convenience, and accuracy in responding to customer inquiries. They can help customers navigate the online store, providing product information, personalized recommendations, and suggestions. In addition, they are able to give customers assistance in making their purchases, such as completing transactions and shipping information. Chatbots are also able to provide real-time customer service, as they are able to understand and respond to customer queries quickly and accurately. Finally, they help brands gain valuable insights into customer behaviour and preferences, allowing them to tailor the online shopping experience and make it as personalized as possible. Thus, chatbots have become an incredibly useful tool for both fast fashion and luxury brands in the online marketplace [61].

For example, Tommy Hilfiger's chatbot provides customers with a variety of options, such as seeing a specific collection, searching for available items, getting stylish advice, and showing product categories. Additionally, the chatbot is able to answer any questions a customer might have about specific products, advise them on the best fashion trends for them, and provide easy payment options. Overall, the chatbot helps customers have a simple and enjoyable shopping experience that is also personalized [62].

Image processing and recognition are important Artificial Intelligence (AI) abilities that consist of recognising the same pattern or similar characteristics across multiple images. This technology is being used in the luxury and fashion industry to create virtual styling tools and augmented reality (AR) experiences. Image processing and image recognition allow customers to upload images of themselves or upload images of products to get a more realistic notion of how it will look on them. Virtual styling tools rely on image processing and image recognition technology to create a 3D model of a customer and then accurately map products onto that 3D model. This allows customers to get a more accurate idea of how products fit them and how certain items might look. Furthermore, AR technology uses image processing and image recognition to more seamlessly merge the physical and digital world in order to create more engaging customer experiences. By utilizing image processing and image recognition technology, luxury and fashion brands are able to create a more personalized and interactive online shopping experience for their customers [63].

Images are one of the most important communication vehicles in the fashion industry, as they are used to convey a brand’s identity and style. This is especially true for social networks, which have become essential marketing channels for luxury and fashion brands. Images allow brands to showcase their products in a visually engaging way that appeals to customers. Furthermore, images can be used to highlight particular features of a product, showcase trends and collaborations, and provide an overall look into a brand that cannot be replicated with just text. Finally, images can be used to tell stories, create emotional connections with customers, and provide customers with a better understanding of a brand’s values. Thus, images are a vital part of the fashion industry, and brands must make sure that they are using them effectively to communicate with their customers on social media [64].

For example, ASOS, the famous e-commerce platform, has implemented visual similarity recognition using Artificial Intelligence (AI). This helps customers quickly find products that they like without having to search manually. In addition, the visual similarity recognition technology can also provide customers with product recommendations that are based on their search history. Furthermore, by using visual similarity recognition, ASOS is able to utilize the images that customers upload and use them to provide more accurate and personalized product recommendations. Overall, AI-assisted visual similarity recognition has helped ASOS create a more enjoyable and effortless shopping experience for its customers.

Virtual Reality (VR) and Augmented Reality (AR) technology are two important examples that luxury and fashion brands have implemented in order to create a more personalized and engaging shopping experience. VR technology allows customers to see how a product would look on them without actually having to physically try it on. AR technology takes this one step further and allows customers to see how a product looks in their own home. Additionally, AR can be used to provide customers with more information about a product, such as its specifications and price. By using these two technologies, luxury and fashion brands are able to provide a more immersive and interactive shopping experience, thus creating a stronger connection with their customers [65].

Artificial Intelligence (AI) can be utilised to integrate the online and offline experience. AI can be used to track customers' shopping habits and preferences, allowing brands to tailor their in-store experience according to their customers' individual needs. AI can also be used to personalize product recommendations, provide real-time customer service, and track store traffic. Finally, AI can be incorporated into interactive features such as chatbots and virtual styling tools to help improve the customer experience even further. By leveraging AI, luxury and fashion brands can gain valuable insights into their customer's behaviour and use this data to create a more personalized and enjoyable shopping experience, both online and in-store.

Smart Mirror technology is becoming increasingly popular in the luxury and fashion industry, as it allows customers to get a more accurate idea of how products will look on them. Smart Mirrors utilize Artificial Intelligence (AI) to track a customer's behaviour and preferences, in order to help personalize their shopping journey [66]. AI can be used to identify customers as they approach the mirror, process customer data such as age, gender, and height, and then provide product recommendations that are tailored to the individual. Additionally, AI can be used to provide interactive experiences such as virtual try-ons, style advice, and product information. Smart Mirror technology has become an effective way for brands to provide customers with a more personalized and immersive shopping experience [67].

## **Conclusion**

AI (Artificial Intelligence) basically focuses on developing and improving intelligent machines in order to enable them to act and think like humans. AI is used in a variety of areas, such as robotics, computer vision, natural language processing, machine learning, and big data. AI technology is used to create responsive, intelligent systems that can interpret data, learn from it, and respond intelligently

in order to help solve real-world problems. More specifically, AI is used in autonomous systems and robotics, where machines can take data from the surrounding environment and make decisions that are similar to those a human would make, such as autonomous vehicle navigation and industrial robots. Developed countries have already begun to apply AI to the textile and garment industry to increase efficiency and help reduce costs. AI is used to design new products, improve the quality of existing garments, and enhance customer service. AI can be used for automated pattern grading and marker making, 3D body scans for personalized fit and sizing, defect detection, material testing, and production line optimization. AI can also be used to help create more personalized experiences by providing detailed customer information, recognizing customer preferences, and helping to customize and recommend products based on their needs. AI can also be used to help increase sales by analyzing purchase behaviours and suggesting related products or bundles. Additionally, AI can help automate and optimize marketing campaigns by providing in-depth customer insights, ensuring the right ad is sent to the right customer, and providing up-to-date analytics on campaigns. AI is enabling companies to become more agile, responsive, and profitable.

The application of AI in garment manufacturing is set to gain momentum in the near future as AI technologies continue to advance. AI can help increase production efficiency across the garment and textile industry, from raw material sourcing to finished product delivery. AI can also be used to reduce costs in manufacturing, such as automating production, reducing wastage, improving products, and managing inventory. AI can also help manufacturers develop predictive maintenance solutions and provide better insights into production processes and customer trends. AI can help automate the quality control process, leading to improved product quality and more reliable results. AI will enable garment manufacturers to become more agile, responsive, and competitive. AI can also support in-house control over production, allowing for quick response and just-in-time concept.

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