

FUTURE TECHNOLOGY TRENDS THAT WILL RESHAPE

FASHION AND APPAREL RETAIL IN INDIA

Patil Sujit Sanjiv ,

MBA Marketing

MIT-SOM, Pune

Prof. Dr. Neelam Raut

Assistant Professor

MIT-SOM, Pune

Abstract:

“Style is the way to say who you are without having to speak” said by Rachel Zoe. Fashion and Apparel industry changing drastically in past decade. Also the Digital disruption changes the functioning of world & technological advancement changes the working of apparel retail industry. Digital technology trends offer interesting opportunities and you have to use them to escalate your business at next level. Technologies such as Artificial Intelligence (AI), Blockchain, Internet of Things (IoT), Mobile commerce, Virtual reality (VR), Bigdata are growing so fast and make every task easy. Technologies use to make connectivity with world and people came to know anything happening in wider environment. These technology helps to connect the physical and

online presence of apparel retail store. These technologies changes the working of front end & back end of retail and has a great impact on consumer behavior. This research paper tells about the technology trends in the fashion and apparel retail.

Keywords: Fashion and Apparel Industry, Retail, AI, VR, IoT, Blockchain, Big data, Future Technology.

1. Introduction:

Fashion and Apparel (F&A) industry is one of the fast growing industry in the world. There is nearly 65% growth in this industry from 2005 to 2020 in Asia Pacific. Its economic contribution to the Asia Pacific is 38%, Europe 26%, North America 22% and to the rest of the world is 14%

and increasing it day by day [7]. The use of technology in fashion industry has increased and the AI system is used in both B2B and B2C. In last three decades there is lots of research focused on the AI, Machine Learning, Decision Support System, Expert System, Optimization (Distribution, Design) etc. used for better working in apparel and fashion industry [7]. AI's one of the most important use is to track the current trend. Fashion trend forecasting is important factor to achieve milestone in this F&A industry. The other study is focus on Virtual Reality (VR) which is used as a new shopping method to enhance consumers experience and engagement. VR is used to understand consumer's in-store exploratory behavior. Fashion big brands such as Topshop & Tommy Hilfiger set up VR runway shows. This VR technology in their retail stores gives shoppers a three-dimensional, front-row view of runway shows experience [8] [9].

Big data is another emerging term in F&A industry. It is an enormous amount of data. It can be defined by the 4V's –Volume, Velocity, Variety, and Veracity [2]. Big data is used to analyze large data to extract valuable information. Fashion world collect large amount of data daily and big data is increasingly playing a part in trend forecasting, analyzing consumer

behavior, preference and emotions. This helps industry to track customer and to meet needs and demands of customer. Big data analytics helps to track the trends in fashion industry as well as shorten supply chains and enabling retailers to obtain a competitive advantage.

Another term used in fashion industry is Blockchain. It is defined by its ability to record transactions on a ledger held by each peer in a network; such transactions can be easily verified and are accessible to all parties on a block chain network without the need of a central authority. Blockchain acts as a distributed database or a global ledger that maintains records of all transactions on a block chain network. The transactions are time stamped and bundled into blocks where each block is identified by its cryptographic hash [3]. The blocks form a linear sequence where each block references the hash of the previous block, forming a chain of blocks called the 'Block chain'. A block chain is maintained by a network of nodes and every node executes and records the same transactions.

IoT and Block chain hybrid architecture can be used to meet organizational goals. Internet of Things (IoT) is a giant network of connected things and people all of which share data about the way they are used in the environment. IoT can

help the apparel retailer's manufacturer and designers to create and sell products customized for consumer's individual tastes. IoT will help to give digital voice to people. This will improve the customer experiences, supply chain, visibility and expand revenue opportunities. Mobile commerce is also an emerging technology in fashion industry. The increase in mobile usage in these recent years helps fashion industry to increase the market share and growth of company by using M-commerce. Efficiency, privacy and price are the three important factors that any fashion industry in M-commerce should consider [10].

2. Literature Review:

[1](Behr, July 2018)The author discussed about "Fashion 4.0". Clothing is changing its way to wear; it's not only just to wear but to connect digitally. He briefed about what is wearable technology, its development, smart clothes and how can smart clothes communicate, interact, used. Author mainly focus on the challenges and implication of these smart clothes. Also he discussed about how advanced sensory technology, IoT, innovative components help to develop new type of clothes in the fashion industry. He also discussed about business models in respect to their value proposition, value

chain and revenue model of company in order to make smart clothes.

[2] (S Jain, 2017)In this literature the authors focuses on the Big Data. Author's used the term fashion data which is associated with the fashion product. The data can be material, fashion design, body data, color and technical / production design. This data can used for trend analysis, customer behavior analysis, forecasting etc. due to use of internet the fashion industry generates and creates various sources of data. All these data come in various forms like words, images etc. In addition to this they proposed a system that the customer want to customize clothes they can give recommendations or else the system will improve its suggestions. The methodology and working of the proposed system is briefly described.

[3](Kamalendu Pal, 2020)The author in this paper briefed about hybrid approach of IoT and Block chain. Initially authors describes about what is IoT and Block chain; their usages. Data which collect from IoT helps to make better decision in business, but IoT system faces problem such as privacy and security. Security and business organizational issues tend to enhance the need to build an apparel manufacturing supply chain management system leveraging block chain ledger technology. In textile manufacturing block chain plays major role in supply chain. This paper

also describes the transparency of block chain system and hybrid use of IoT& Block chain.

[4](Singh, 2018)The author describe about the IoT in apparel manufacturing. He had discussed about the how IoT works, how it is going to impact human life. Now-a-day's IoT is playing the important role in human life any human become an technology drive, so author describe about value of IoT; what are the different sectors may include IoT for e.g. Healthcare, Business, Home, etc. as well as how IoT will help us. Author mainly focused on how IoT help in apparel manufacturing sector. IoT, automation, robotics may help this sector. IOT may use to improve the customer experiences enhance supply chain, increase more brand visibility and revenue of company. Basically this paper gives idea about the use of IoT in apparel manufacturing and future of apparel manufacturing.

[5](Parker, 2016)The author Christopher J. Parker describe an appraisal of m-commerce platform by market level. Mobile app become a platform to purchase products. Initially the paper describe about the four level of categorization of fashion retailer market level which are Economy, High Street, Diffusion, Luxury. The two different forms of fashion retailers are fashion brand and retailers. Finally, within this report, two

categorization of mobile app features are presented such as retail and experience. This report reveals that many of luxury brand have released their iPhone mobile app and their app rarely allow for the purchase of products but the mainly focus on brand experience. This is contrast to other fashion retailers.

[6] (Minjung Park, 2018)This research paper give brief information about virtual reality (VR). While conducting this research the researchers created four different store layouts, different fixtures, unique window display setups, and walking paths of customers while using the same merchandise in the store. The changing of different store layout is easy and fast and controlled by researcher. Total 40 female participated in this study and their VR experience is recorded. The results showed that the VR experience was positively related with important shopping outcomes such as happiness, customer buying behavior and attitude toward virtual stores. The VR provides consumer a memorable, realistic & distinct shopping experience.

3. Fashion Technologies:

3.1 Artificial Intelligence (AI):

AI can be defined as “It is a systems that display intelligent behavior by analyzing their environment and taking actions with some degree of autonomy to achieve specific goals. Today AI is allowing to foretell sales and cyclic fashion trends which will be allowing brands to understand consumer behavior, purchasing patterns and predict their production levels(Ghai, 2019). So AI is helping the retail industry to plan, predict and promote clothes, fashion color while improving product availability and accurate deliveries. Today number of fashion brands are already using big data, machine learning to enhance prediction and improve search on their sites. When consumer are using mobiles, tablet, laptop, etc. to shop online that time AI uses machine learning, algorithms to predict customer behavior with a high level of accuracy based on its understanding of a set of recurring parameters, search query and browsing records. Digital technology is used by companies to make customer delight by using personalization. For personalization you needed the customer real-time data [29]. Fashion data is a data that is related to fashion. There are a number of different factors which are used by brands to find customer’s preferences. Factors such as type of device used for purchase, number of visits to a website, or demographic information are largely

permanent characteristics of a shopper that help brands in measuring customer preferences, change in behavior and according to that brands tailor experiences on the site.

Previously companies focus on to collect physically assembled information but today retailers are using AI to gather, compose, divide and sort information into important classes that would then be able to be utilized to predict and comprehend what their customers are searching for and deliver the same. For example AI is used in Screenshop application which is made by Kim Kardashian that use AI picture to make style easy. The user in this application have to just snap a picture or screen capture anyplace of a look they like. When user will open the application to discover comparative items at any cost so user can shop the entire look. This Screenshop helps user to choose different products as per their preference and like. AI used in mobile application and Chabot’s which helps to increase customer experience & product suggestions[9].

Fashion market is very large and fashion is major part of people daily life. AI used in virtual trial room which customized virtual avatars for virtual clothes. This is a new experience to customer in retail shopping. Machine learning,

decision support system, expert system, optimization and image recognition & computer vision these are AI in F&A industry. In fashion industry supply chain also plays important part (CHANDADEV I GIRI, 2019). In order to manage effectiveness of supply chain companies have to focus on the demands of products. Product demand depends product variety, product lifecycle and other factors. Due to the change in nature of fashion industry demand forecast is also a challenge. For this reason the use of AI in fashion industry is increased in recent years. Machine learning is used in inventory management and this helps retailers to reduce forecast error. AI also used by retailer in order to increase stock turnover and operational procurement. AI also used in warehouse management and automation. These are some areas where AI is prominently used in fashion industry.

3.2 Big Data:

Big data is a collection of data that is huge in size and it is growing exponentially with time. Big data is technological term used in the business world and the fashion industry is no stranger to this. Big Data can be defined by the 4V's which are Variety, Velocity, Volume and Veracity. In

order to get required output this Variety, Velocity, Volume and Veracity are responsible for complete analysis and functioning of data. Big data analytics is the ability to analyze huge amount of data(S Jain, 2017). It is also used for analyzing and predicting customer behavior through data derived from internet, social media, etc. Big data is used in the F&A industry to provide customer insights for products. Big data benefits in online shopping such as; it helps for better customer relationship management, customer personalization, better browsing experience, speed of market & fashion trends and new Omni-channel strategies.

The data which is associated with a fashion product called as fashion data. This data is used for trend forecasting, analysis, customer behavior analysis etc. In fashion industry huge amount of data is generates and creates from various sources. All these data come in various forms like words, images, etc. The fashion data classified as material, fashion design, body data, color, production/technical design. Decision related to manufacturing textile products also get influenced by big data (S Jain, 2017).

In this covid-19 pandemic, retailers have started jumping on the digital platform and are using advance automated machines to their advantage.

Now-a-days it is become common that big fashion multinationals companies are collecting data and used for better customer experience. There are different types of resources to collect and manage important data already exist, such as Enterprise Resource Planning software and online analytics. Though, many fashion companies do not know how to use big data to help their businesses grow nor they fully understand the potential of big data but they are trying their best to use big data efficiently. Company may be used big data; it will help company to grow in many ways by using big data insight such as; it may help to increase conversion rate, predict future sale, help to find new leads, generate repeat sales, help to reduce cost by optimizing supply chain, predictive selling, communication (ERP software).

For example e-commerce giant Amazon is gaining ground in the F&A industry. Initially Amazon is not driven by fashion but by data and technology advancement company is establishing its root in fashion industry. Amazon has a patented factory model for on-demand manufacturing of personalized garments with next-day delivery. Big data is used for unblocking company's potential growth areas and also used for optimizing supply chain. Big Data helps to analyze and

understand; how the consumer engages with brands, which is important for enhancing brand communication and brand equity. Big data used for trend forecasting, reducing waste, enhance consumer experience and marketing campaign, better quality control and less counterfeits and shortening of supply chain in fashion retail. General Data Protection Regulation (GDPR), lack of technical competency, lack of data savvy fashion graduates, access to fashion data these are some challenges for big data in fashion retail(Silva, 2019).

3.3 Blockchain:

Block chain is a database that's validated by a wider community, rather than a central authority. It is used for guarantee traceability & transparency along the entire value chain which a peer-to-peer network. If the network is large then it is difficult to corrupt data. It is a modern technology used to record transactional information, originally created for cryptocurrency transactions. Each "Block" are made up of digital piece of data that represents a number of transactional records, and the "Chain" represents the links which connects blocks all together with a hash function. So, they are confirmed by a distributed network of computers and paired up with the previous entry in the chain and it creates

a chain of blocks, or a block chain. It is a decentralized database system that provide security to data and make it trustworthy (Kamalendu Pal, 2020). This is used to reduce human errors and misapprehension regarding product payment terms, returns, purchases, etc. and used to prevent fraud. Block chain is used in healthcare management, fraud detection, E-government, record management and administration, etc.(Miraz, 2018).

Block-chain is used in fashion industry and this industry has found a way to use it. It is used in transparent supply chain and gives each product a digital ID. This technology has the unique ability of creating a physical-digital link between goods and their digital identities on a block chain. With block chain, you can create a digital history of information or an audit chain of the total value chain, with timestamps, for each product. This data is immutable so block chain places an extra layer of security. This will be used by both brands and consumers to have an end-to-end digital track record for all process and products in their inventories. For example if we take a apparel and footwear manufacturing network it consist of different data such as raw material production, raw material processing, fabric material, intermediaries, finishing, suppliers, fashion brands and retailers [26].

Value chain management, Access to market & User management these are application of block chain in fashion industry. Value chain management consist of anti-counterfeiting, traceability, lean administration and control, IPR protection. Access to market consist of decentralized on-line marketplaces, decentralized reputation management, decentralized influencers marketplace, decentralized digital advertising, loyalty programs management (Elisa Pautasso 2019). User management consist of user involvement in product development, user data sharing and consumers becoming "prosumers". The hybrid combination of IoT&Blockchain is used for security, scalability, data management [3]. These are the ways block chain is changing the working of fashion industry.

3.4 Internet of Things (IoT):

In fashion as time passes drastic changes are happening. IoT is new technology that help fashion and apparel industry to reach next level. IoT stands for Internet of Things that encompasses everything connected to internet. It has ability to generate new information constantly from environments, vehicles, clothing, cities, buildings, portable devices, etc. This technology give us a chance to associate with different things

through the web/internet (Singh, 2018). IoT is used for inventory management, security, data sharing and increased efficiency and productivity. Its applications are in various fields such as in healthcare, ECG, agriculture, logistic coordination, industry, retail, remote monitoring, smart ink, smart clothes, etc. (P Parhana MV Lakshmaiah, 2017). Many businesses consider IoT in improving their customer experience. RFID, Sensors and in-store cameras, Automated checkouts, Beacons these are consumer-centric elements of IoT.

Due to the advancement in technology there are lots of progress happened in fashion wear also. Fashionable clothes, smart clothes and wearable gadget are changing customer experience. The use of wearable gadget, smart clothes are increasing rapidly day-by-day. This means developments in computing technology creates computers so small that they can be integrated in clothing, complete with sensors and a battery. According to WT VOX 2018 survey 15% people believe that wearable technology makes them look more attractive and 24% people think wearable technology infused in apparel makes them appear more intelligent or successful. All these wearable gadget, smart clothing, multi-functional designs, responsive sportswear, etc. are connected to internet. These wearable products

connected through RFID, NFC, Bluetooth, Built-in solar cells & rechargeable battery, etc. For example Hexoskin smart shirt gives you insights into your Health Status, sleep, and personal daily activities and connected with iPhone, iPad, & Android by Bluetooth. This used to track ECG & Heartbeat, Heart Rate Variability (HRV), QRS events, and Heart Rate Recovery Breathing Rate (RPM), Minute Ventilation (L/min), etc. [28].

According to Retail Vision Study report 70% of retailers across global are ready to adopt the IoT to improve customer experiences and to attract customers. Apparel items will have digital capabilities that connects customer and retailer. The Omni-channel retail is new term emerging now-a-days; this is using channels such as in-store, online and mobile channels. The IoT in Omni-channel retail helps retailers to connect the physical and digital worlds for consumers. The large data produced by IoT challenged retailer to convert it into valuable information. If the retailer do it successful, then it will help them to understand customer needs, making profitable decisions and delivering better customer service. IoT also use to optimize supply chain, used in inventory management, used in selling channel, expand revenue opportunities, etc. IoT technology based on robotics and automation which provide a platform for smart

manufacturing. As per consumer's individual tastes, preference IoT can help the apparel manufacturer, designers and retailers to create and sell customized products. These are advantages of IoT technology. In coming future the IoT may be used in apparel manufacturing factory; to connect the factory, smart grid, production facility to internet for data generation.

3.5 Mobile Commerce (M-commerce):

Fashion has always been a hotbed for innovation from the invention of the sewing machine to the rise of e-commerce. According to "The Fashion and Apparel Industry Report" e-commerce fashion industry revenue worldwide expected to rise from \$481.2 billion in 2018 to \$712.9 billion by 2022. The increase in use of smart phone and internet changing the consumer behavior and helped them to use multiple channel in shopping. Due to mobile phone anyone, anywhere, anytime have access to internet. Mobile commerce also known as m-commerce is the use of wireless handheld devices like cellphones and tablets which is connected to wireless network to conduct commercial transactions online such as purchase and sale of products, paying bills, online banking, etc. Mobile commerce have many application like SMS shopping, Mobile shopping,

SMS banking, mobile ticketing, mobile marketing, mobile banking, mobile entertainment, etc. (OmkarDastane, 2018).

Mobile commerce introduce a shopping through mobile to user. People are using different mobile platform such as apple, android and windows to shop products. Recent studies have shown that people who are 25–34 year olds prefer to purchase products via mobile app. By use of m-commerce personalization become easy. Today brands have noticed that shoppers read different content/information related to product, visit different sites and compare prices before buying [29]. Today due to mobile phone customer have power in their hands and for any doubt in online shopping mobile is the answer. Now-a-day's brands are enhancing customer experience & journey by offering different channel for sales like apps, social networks, blogs, groups and communities [30].

So m-commerce become an essential part of fashion and apparel industry. Mobile application is point of differentiation. The mobile application must have a unique design and content in application synchronized with online website. In order to increase the use of mobile application company have to focus on digital marketing to retain customer. On the other time mobile

commerce use to save time and time is more than money. In m-commerce by doing personalization, geo-fencing and push notification company can attract customer attention. Consumer may have 24/7 access for shopping product online by using m-commerce. Price, privacy and efficiency are important in fashion m-commerce [10]. Thus, m-commerce is an emerging term in fashion and apparel retail.

3.6 Virtual Reality (VR):

The purpose of all innovations in science and technology is to make people's lives more convenient and better and bring changes in production and life style. Virtual reality (VR) is one of the recent technology and is used to change fashion industry & overall customer experience in-store and online. VR is a computer-simulated, realistic three-dimensional environment. VR allows user to interact with environment. This technology is used to merge physical and online world of retail. Virtual reality and Augmented reality (AR) are used to improve customer experience and to make customer more delight. Fashion shows via VR was being streamed by Tommy Hilfiger, Victoria's Secret and other labels. AR is being used in virtual fitting room for customer engagement [31].

VR helps in three areas such as E-commerce, Physical retail, Marketing. In e-commerce it help customer to see product in 3D view, for example Virtusize is a fashion tech company provides virtual fitting solution to customer that helps buyers visualize how to measure their favorite item at home and also this help to provide measurements for custom fit garments. This helps to increase sale, decrease return and to enhance customer experience. In physical retail the use of AR is to let shopper's access digital media on in-stock merchandise [28]. For example the Timberland augmented reality campaign, Zara also planned to include AR in their chains. In marketing it is used to create an experience to customer to make them delight. For example Walmart's Innov8 VR store is use to create experience to shop racks or runway using a headset and complete the checkout process in VR [23]. VR technology is also used in creating virtual apparel stores which are of different store layouts, window display setups, fixtures and walking paths of customers and used to take feedback from customer about their experience and to make changes in store. This platforms provide added value to the retailer, as different brands can gain insights through regular customer use, which can be used to provide customers with a more personalized experience (Minjung

Park, 2018). In coming future VR will continue to progress and make technological advancement in F&A industry.

4. Discussion:

Now-a-days technology is one of the most effective and important factor that can shape any industry. Today, the fashion industry is facing great changes and it is one of the most challenging industries. Market is dividing into fast fashion and by use of technologies like Artificial Intelligence (AI), Blockchain, Internet of Things (IoT), Mobile commerce, Virtual reality (VR), and Big data players in this industry want to become leader. These technologies can be used to fix problem like inventory, cost, transparency and supply chain in F&A industry. So, manufactures, suppliers and retailers should pay attention to manage innovation as the scope of this F&A industry goes way much beyond "designer fashion". It is obvious that the technologies used in retailing have numerous advantages like time, place and purchasing advantages for companies and the enjoyment associated with those technologies appeals hedonic value of consumers. Thus, this study discussed and provides information about the future trends

in fashion and apparel industry which will be helpful to change the face of industry.

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