

## A Paradigms shift in Apparel Industry

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**Abstract :** The paper aim is to develop a structure in apparel industry that save time, efforts and forward good manpower with effectual. The typical problem of the garment industry is long production time and prognosticate the fashion. To provide a method for the apparel market is very essential. Customer can adopt emerging technology and finalize their outfits. It is very smooth and quick.

**Methodology:** To investigate how well 3D scanning and 3D Simulation represents the physical reality of a different part of the body were analyzed and compared .The physical fit assessments were performed by 3 different experts. The physical and virtual fittings of different users were compared. The relevant parameters for a realistic fit simulation were worked out. This method, even with the use of experts, does not guarantee a good fit for everyone. Standardized charts are developed for specific body proportions. Data from this project was collected from a fashion design program. The Product Lifestyle Management course requires students to have already passed a 2D/3D Computer-Aided Design course, and therefore students are familiar with clothing drape/simulation using a standard program avatar.

**Findings:** Computer simulation for virtual fit allows for quick pattern alterations for fit or style purposes. For example, a long sleeve dress was designed and the buyer wants the same dress body but with short flutter sleeves. Instead of having a sample maker create an entirely new garment in a week, they could make the alterations within the software and generate a new garment within a few minutes.

Here technological improvements and its packages play a decisive role. Research suggests that consumers express readiness to use avatars to try on clothing when the body size of the avatar appears to be close to their own size. The use of personal avatars appeal to consumers who envision a variety of applications such as monitoring health, taking exercise classes, clothing selection, and as an entertainment activity. E-commerce retail businesses can adopt virtual fitting rooms for virtual try-on as part of a business strategy to improve consumer satisfaction in terms of fit.

**Practical implications:** A number of research findings and contributions have sought to be fulfilled, but of course, there are some limitations in the research. As a reference for the next researchers to produce better research studies, some limitations in this study are presented as follows:

This study used the Apparel industry variable. However, the focus of research is in apparel industry which is not allow the things on IT based, these brands appear online as a weakness because the average product from them is already well-known.

The company have their own design secrets, they don't want to disclose them to anyone. They develop designs, styles and garment for particular client. If they do online their work their whole collection will be common and it's not good economically also. 3 D simulations, Virtual prints development and ERP is not achievable models for common people. The person who is living in rural area and not able to read, face problem to do work on sophisticated system. These are not modernize system so some time not work properly and people get untidy. The time and money is very essential to understand the network.

**Originality/value:** It is come across that there are still few studies about the connection between the garment business and IT, and there are disparities between the sectors examined in terms of the

impact of information technology. IT is new technique and good to enhance the system. Religiosity is associated with consumer-perceived value expressed as originality in this study because the researcher has not found this relationship in the previous studies. Regarding the relationship between apparel industry and Information technology, it is found that there are still different opinions in the research results on the effect of apparel industry and IT.

Keywords: 3-D Scanning, 3-D simulation- Virtual fit, Digital Printing, Real Time Data Monitoring, Computer Color Management

Paper type: Research paper

## 1- Introduction

Global market could be simplest for five computer systems. And today it's pointless to mention that this prediction turned into totally incorrect.(Cohen, D.et.al,2014) Computers and Information generation (IT) have now not most effective modified however revolutionized our lives in major way. The identical is proper with apparel enterprise also. (Al-Azmeh, A., 2009),

In the technology of adjusting fashion enterprise, where client is annoying services and products as and whilst required, Product existence cycles are shrinking regular and then the business dynamics and opposition too. (Michaela and Lavie Orna, 2015). Since years, computers are employed in clothing manufacturing units to beautify the performance, error proofing, lesson through put time, effort and manpower saving . (Afonso Vieira, V.,2009), It's developed as a key operational constituent of grab manufacturing.

The paper discusses some major IT based tools and techniques which are redefining the approaches and leading to quick response apparel supply chains. (Hassim, N. 2014)[1].

## 2- Review of Literature

This section provides an overview of the existing literature. After reviewing the literature in current years it comes out 3 D Scanning, 3 D Simulation-Virtual fit, Digital Printing, Real Time data monitoring, computer color management, all parameters are very important in apparel industry.

Transparency in Apparel Industry: Apparel industry is very big industry and people know about the fashion and everyone wants to grow. Through the IT it's advanced and everyone can choose designs and styles very easily at home. (Hassim N,2014). By using AR/VR, businesses can create a virtual environment that allows customer service representatives to interact with customers in real-time, regardless of location. (Dahlstrom, P. & Edelman, D, 2013) Applications of augmented reality make the customer experience more efficient and comfortable. AR technology enables people to virtually model and try on items such as: clothing, houses, jewelry, makeup, cars, and furniture.( Farrag, D.A. and Hassan, M. 2015), This enhanced experience leads to measurable positive responses and increased sales. Save time and money by reducing travel. Improve safety procedures.(Fischer, J. 2011), Boost collaboration and productivity across projects and locations. Enhance customer service & increase sales.[2]

**2.1- Consumer Preferences:** More Pronounced Now. Now a days consumer become very particular and they always want a good quality to wear .So consumer preference is very important in certain cases. Augmented reality deeply affects decision-making by reducing confusion, frustrations, and subsequent good returns.(Gandhi, A., Mager, C. & Roberts R ,2014) When customers can see how a product will look in their homes or bodies before making a purchase, they are more likely to be satisfied with the product and consumer preference is the best way to increase the sale.( Hassim, N.,2014), It create lush, immersive, and interactive user experiences and enable consumers to get up close and personal with your product or service. When used correctly, virtual and augmented reality could improve buyer awareness, offer better personalization, and speed up the purchasing process. (IT in

Apparel Manufacturing, Stitch World, January, 2014)

**2.2- AR and VR can help customers recreate life-like shopping experiences and thus increase confidence in the product that they are looking to purchase.**

**2.3-Sustainability and Fashion Industry:** The literature on environmentally sustainable practices in Textile, Apparel and Fashion (TAF) industries to allow the mapping of practices across various manufacturing processes and the development of a conceptual framework to guide investigation of the extent of sustainable practices in TAF industries from an environmental perspective. (Jana, P, 2013) Turning towards Circular Trends. Everyone use the sustainable products for the long lasting .Fashion industry works on sustainable things. After classifying the articles related to the search themes, (Jasmine, 2007) integration of sustainability within fashion business models, measurement and reporting, and sustainability drivers within the fashion business models.

**2.4-On-Demand Production in Fashion Industry:** Producing with Agility. Generally hi fashion garment is produced on demand of customer. For that they need time and always choose the market according to fashion. On-Demand manufacturing is a production model when goods are only made when or as they are required. In the fashion industry, this is also called made-to-order. Here, brands will not send the quantities they need to their manufacturers until their customers have directly ordered the product. ( Miragliotta, G.,et.al,2009)

**2.5-Social media fluency for creating strong brand presence and reaping revenue through online sales-** One of the most important reasons to use social media for your business is to increase brand awareness. ( Miragliotta, G.,et.al,2009) With 37% of customers naming social media as the most significant source of inspiration for their purchases, (Jasmine,2007) it's safe to say that increased brand awareness results in an increase in leads as well. Benefits of social media for business is attract customers, get customer feedback and build customer loyalty. Increase your market reach, including international markets. Do market research and reduce marketing costs. Increase revenue by building customer networks and advertising. (Jana, P,2013)

**2.6-Product configurators for designing tailor made products-** A product configurator is stand-alone software that supports insurance product development activities, including pricing, product modeling and testing. It enhance the business and customer satisfaction. (Michaela, E. and Lavie Orna, S. 2015)

**2.7-Intelligent data insights for offering personalized recommendations and predicting style trends-** AI works by combining large amounts of data with fast, iterative processing and intelligent algorithms, allowing the software to learn automatically from patterns or features in the data. (Product Development-Fashion at Warp Speed, Stitch World, March, 2011)

**2.8- VR mirrors in virtual dressing rooms-**As many research said virtual mirrors are the best in changing room it can help to increase sales by giving customers a more immersive experience that allows them to try on products virtually before they buy them. It save the time. A virtual mirror or smart mirror is a device that displays a user's own image on a screen as if that screen were a mirror.( RFID: The ruling Price Tag of the Future, Stitch World, February, 2007)

**2.9-Digital printing for the perfect finish and many more-**In any industry digital print is the best way to save the time and give buyer the same print in short time. In any apparel industry buyer give order and he want to see the sample in same prints and design which he/she has given. Manufacturer can print it by digital way and show the samples in very short time.

(Tim,Stitch World, March, 2009)

### **3- Different Methods**

**3.1 Apparel supply chains and Information technology** -In the latest years style enterprise has grown to be whole lot extra modern apparel and styles. The time among recognize the tendencies to the apparel shipping to the very last purchaser is shrinking to meet necessities of quick fashion<sup>4</sup>. The opposition has shifted from “Company vs. Company” to “Supply chain vs. Supply chain”, and the key consciousness is on the technologies that could increase the supply chain performance<sup>5</sup>.

With the accelerated use of new things (especially facts technology) with virtual surroundings, the customer is looking forward to offerings different things. (Woodward, 2007). The product quality is being checked through their capacity to supply and provide the excessive degree of value in the product or offerings that's matched with the customer satisfaction [3].

To benefit the aggressive gain, it is very essential to gauge the purchaser necessity earlier than product improvement. Use of generation coupled with statistics is the important thing to fulfilment, getting rid of tooling charges. (Wilson et al. 2015) The textile chain begins with fibre manufacturing, improvement of yarns & fabric, apparel production and ultimately distribution of the product to consumers via shops. Market demands are incredibly unstable with widespread product versions. Considering the dynamic nature of style and to put off the opportunity value, items want to be replenished often as shipping volumes are rigidly coupled to real end consumer demand<sup>8</sup>. Speed to marketplace, product development, tight pricing and productiveness are four number one points for achievement to any company. (Afonso Vieira, V. 2009), This has brought about an independent manage coupled with IT interventions at nearly all of the ranges of clothing deliver chain right from style forecasting to the shipping of completed products to the consumers.( Wilson, J.A. and Liu, J. 2011)

IT in apparel sector increases the forecasting equipment, Virtual color printing using color management and 3 D simulation [4].

### **3.2 Areas of Information technology interventions in Apparel chain**

**3.2.1-Fashion forecasting** - Fashion forecasting is very important for the supplier as well as customer. If the supplier now that what trends will come in the market and how the customer increase then they will create the range accordingly. ( Dahlstrom, P. and Edelam, D.,2013) In the Global market the competition is very high and everyone wants to grow up their business so its help very much to choose the correct market .Information Technology helps the supplier to create the correct goods and supply the goods to the client within weeks. IT play an important role to know the market and destiny trends (Al-Azmeh, A.2009). This save the time to go here and there and also save the money. They can discuss different moodboard and designs to each other in same platform. Through the fashion forecasting supplier prepare a whole range in different prints and colors. They prepare the collection for different age group. Suppose winter'22 is coming and we are in summer'21 then the planning of winter'22 will start before the one season so forecasting play a very important role. All the sellers prepare the collection through forecasting and when right times come they launch the range in the market (Hassim, N. 2014) [5].

### **3.3-Digital printing for the perfect finish and many more.**

#### **3.3.1 Conceptual Framework**

**3.3.1.1 3-D simulation** - 3-D designing and simulation using IT tools has established itself as an integral part of new product development. Earlier it was used in the fields of aeronautics, defence and furniture but slowly yet steadily it has gained acceptance in fashion design and resulted in terms of cost reduction, enhanced creativity and improved communication (Bhaskara K.et.al, 2014)



Figure-1 3D Virtual fit simulation technology: strengths and areas of improvement for increased industry adoption

In earlier days the technology was used for visualization purpose only. With the time technology has grown in scope and now capable of performing complete simulations and able to provide the fit solutions in a completely virtual environment [6].

Fit issues present a real challenge to the designers and product developers. It's always a difficult task to meet the fit requirements of customer in the sample. As traditional practice, samples need to be developed and to be sent to the customer for fit approvals. And based on the comments received from the customer fit needs to be improved. (Farrag, D.A. and Hassan, M., 2015) This is a quite cumbersome, expensive and time consuming process. It is observed that a single prototype can cost between USD 250 to USD 1000 and its costs even more when designing and development cost are included. Further the cost goes higher with each rejection of the prototype. IT enabled 3-D simulation offers much simpler and cost effective solutions where physical developments of prototypes can be eliminated or significantly controlled resulting in time, effort and resource saving. (Gandhi, A., Mager, C. & Roberts R., 2014)

Virtual Avatars can be developed using 3-D body scans. Garment designs with required fit and fall can be simulated by incorporating the fabric properties (such as weave, color and drape etc.) and pattern properties. This completely eliminates the process of fabric development, cutting and stitching of sample. At the same time, all the modifications also can be done virtually and re-simulations can be done as required referring to the customer's comments. (Jana, P. 2013) This results in huge time saving in sample modification and gives quick yet accurate results.

As further advancement to 3-D simulation, the Avatars are now even dynamic in nature, means the simulation can be done in different postures such as walking, bending etc. These Avatars are enabling a garment to be virtually reviewed, refined and measured before the first piece is ever cut physically. (Wilson, J.A. and Liu, J., 2011).

Tim, 10 is such an advance parametric Avatar by OptiTex which is a ten year-old avatar. Designers are able to change the size one or more body parts. Other such other Avatars are Adam for male, Eve for female, Jasmine for young girl and a baby avatar too. This helps in bridging the gap between virtual environment and the real scenario and many of the new generation Avatars are even capable of doing catwalk which makes even virtual fashion show a reality (Hassim, N. (2014)

With the help of information technology, development of prototype in virtual environment has become must faster and accurate. There are two basic ways currently being practiced, in the first one pattern developer creates 2-D pattern considering the fabric properties and garment requirements. Then the patterns are tried on the virtual model. The software programme shows the areas of stretch on 3-D virtual model like a thermal image. Modification in the 2-D pattern are suggested by the software accordingly. The other way is where the developer manually draws where the lines go on the 3-D model (similar like development of pattern using traditional draping method) and software suggests the 2-D pattern. However the latter method is suitable for close fitting garments only. (Thomas, R.,2013)

Considering the amount of time spent by consumers (especially young consumers) on-line using internet, the idea of developing “virtual communities” has also become realistic. (Miragliotta, G.&et.al,2009), A Now individuals can create their virtual identities (Avatars) using 3-D body scans and can interact online and experience virtual try-on by putting the required designs and color combinations on their avatars. The requirement, tried on avatars can be sent online to initiate further business activity.

Some of the global leaders providing 3-D simulation solutions are, OptiTex, Lectra, [TC]2 , and TukaTech etc.



Figure-2 3D simulation is a computer graphics technique that allows artists to create realistic effects like destruction, fire, liquids, smoke, and particles in their scenes. Realistic simulation of an environment, including three-dimensional graphics, by a computer system using interactive software and hardware.

**3.4 Virtual prints development** – Designer can create their own designs and fabrics including knits and woven .Designer can make different prints using coral draw and Photoshop and prepare extensive range of fabric. After making design they create human body and virtually check the design on human body. Customer check the virtually and give suggestions over prints and design .Such things save the time, wastage of fabric and color to create the whole range. Designer prepare the whole range and approve the same virtually then only proceed for the sampling and production. Virtually print development is very good process to know about designing and print making. It reduces the manually



work and person get idea about his outfits. customer choose the designs and decide the outfits and make corrections in designs and outfits. (Al-Nahdi, T.S.M. and Islam, A., 2011)

Some of the major company are Fashion Studio by Blue Fox Nedgraph ics, Vision Fashion Studio by Gerber, Prima Vision by Lectra and Tex-Design by Koppermann etc.

**3.5 Digital printing** - Digital printing is one of the most advance things in apparel sector. In the earlier time once people want to make some garment then they have to print the fabric and for that they follow the whole process like make the screen and develop over the fabric but now a day s digital prints has come in the market .If people like some prints then they develop digitally over the fabric and make the dress accordingly and if it is not good then they can try another prints .It save the time and money. Designer can make different options and customer has choice to develop the design in desired prints. Designer make designs over CAD and develop the prints by Digital printing in workplace through Digital printing. This Printing gives flexibility to create different range of colors on paper and fabrics. This method is used now a days very frequently and conventional method of screen making is removed totally. Some company have digital printing machine and they make different options of color and design for the customer. (Dahlstrom, P. & Edelam, D., 2013)

Digital prints is very different from the screen prints, Digital prints give instantly designs on fabric while screen prints takes time. In screen printing first develop a screen then you can print over the fabric .It takes minimum 15 days to final the garment while screen print give result in one day .

(Al-Nahdi, T.S.M. and Islam, A. 2011), Digital prints always quick and got result instantly .Sometime customer get confuse regarding colors and designs But one idea regarding the design assumed. Screen prints give proper colors and prints but takes time. Screen print is good for the bulk production not for sampling and Digital print is good for the sampling purpose. Screen prints give more vibrant colors and it is one time process while digital print follow 4 colors process in one print. Digital print is based on heat transfer process and fully depend on colors management .Digital print is costly and not good for the bulk production. (Bhaskara K.et.al, 2014) Digital prints gets fade after 30-40 washes so in digital print is not long lasting and secure .Always for the bulk production choose only screen print, it gives better result and better quality .Digital print economically is very costly and not friendly so preference always is screen printing in the industry, (Hassim, competition. This has resulted into increased dependency on technology. At the same time tasks need to be finished in lesser time with improved transparency. In order to make the process accurate and faster, need of real time updates with minimum human efforts has emerged. Time has become one of the most important deciding factor for business success. This makes the organizations more competitive and result oriented by minimizing the errors and keeping management updated. This has led to use IT solutions which are capable of seamless linking of all the facts of apparel business. This linking is not only limited to the process of apparel manufacturing but also connects suppliers, suppliers' suppliers, customers (inter and intra), human resource, sales & marketing, and logistics. Enterprise Resource Planning (ERP) solutions are providing much needed support in accelerating the process. Now a days ERP system is used by the manufacturer, they update the whole system on ERP and get information on time to time. ERP is very good to know about the stock of fabric, different store accessories and in different logistics work. (Woodward, I.2007).

**3.6 ERP** - Operational complexity has increased with the growth of business and competition. This has resulted into increased dependency on technology. At the same time tasks need to be finished in lesser time with improved transparency. In order to make the process accurate and faster, need of real time updates with minimum human efforts has emerged. Time has become one of the most important deciding factor for business success. This makes the organizations more competitive and result oriented by minimizing the errors and keeping management updated. This has led to use IT solutions which are capable of seamless linking of all the facts of apparel business. This linking is not only limited to the process of apparel manufacturing but also connects suppliers, suppliers' suppliers, customers (inter and intra), human resource, sales & marketing, and logistics. Enterprise Resource Planning

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**3.7 Real time data monitoring using RFID-** Radio Frequency Identification (RFID) is a type of automated identity system that belongs within the Automatic Identification and Mobility category (AIM). By utilizing RFID tags, readers, and software<sup>18</sup>, it is utilised for remote identification, monitoring, fact retrieval, and storage. Apparel production is complicated by a number of factors, including product variations, material variability, and, most importantly, an excessive amount of human intervention. This makes it difficult for management to see information<sup>22</sup>. (Stitch World, March, 2009) Due to the lack of access to the most up-to-date and accurate facts, it can be difficult to make the best decision. The use of RFID-based complete solutions allows for real-time records to be kept at every stage of the transaction. And the equivalent is completed and communicated immediately away. This clarifies everything. Through the RFID different information can get like wash care instruction on labels, different information about product. (Stitch World, February, 2007)[8]

#### 4-Result Analysis

To collect these data, a mixed method approach was used and the participants were selected using some digital tools, such as email, social media (Facebook, Instagram and Whatsapp). The methodology used is applicable when there are both qualitative and quantitative data to collect and analyze. (Miragliotta, et al 2016)

Participants were invited to complete a form concerning the following topics, divided in five blocks:

1-Fashion forecasting

2-3D Simulation

3-Virtual Print development

Table 1. Z-test sustainability fashion index.

Data	Value
Fashion forecasting Female (Mean)	3.37
3D Simulation Male (Mean)	2.91
Virtual Print Development Females	0.43
ERP Males	0.87
Real data time monitoring system Females	750

Table-1 The data is collected from apparel industry and result is shown as per value of different aspects of research

The results of the survey show that Fashion Forecasting is 3.37 value which is more than 3D simulation male. Virtual print development females is 0.43 means female have interest to do this. ERP males is 0.87 which is less than 1 and real data time monitoring system females is highest 750. [9].

#### Conclusion

The concept of "on-call for" advertising arose from the increased interference of information generation in our lives. The definition of customer experience is being rewritten as a result of an increased usage of era. The technology that has evolved with the internet and now includes all of the most up-to-date data is expected to increase demand even more. This trend has been recognized by a wide range of businesses. Organizations that are fully integrated, with their own creative teams, manufacturing



facilities, and logistic and revenue outlets, are best positioned to take advantage of IT. They've honed their ability to respond quickly and precisely to the needs of their customers. As a result, we're seeing a rise in business styles that try to deliver such custom-designed services. The advanced technology in different sector is good but on certain level, still people like to go on shopping mall and get the designer outfits. They try in trial rooms and always purchase after full satisfaction. Virtual fit is new concept but people afraid to scan the body especially females and it is not success in general.

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