Fashion Design, Digital Technology, Aesthetics, and Contemporary Society – A Critical Review

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ABSTRACT

This comprehensive review is on the dominance of digital technology in fashion design, aesthetics, and profound jounce on the values of individuals in contemporary society. A commensurate understanding of the relationship between digital technology, aesthetics and fashion design is essential to examine the developments, transformation, and socio-cultural surprises in the years to come. Hence, the aim of this research is to bequeath insight and impart new knowledge to the literature encapsulating the following complex interplay between digital technology, fashion design and aesthetics impacting the psychological influences and emotional contagion in the society : (i) introduction of the world of wearables (WOW) that crosses boundaries between many disciplines using wearable operating system (WOS), (ii) describes the indispensable pillars of design imagination that express the product's defining points of importance, (iii) demonstrates digital transformation is a mindset than about technology for the fashion design and development process, (iv) reveals aesthetics as 5C (comfort, communication, care, convenience, and context of usability) experience that actualize user bond and loyalty, (v) justifies fusion of digital technology, aesthetics, and fashion design that offers an array of amazing advantages that creates value for the consumer, (vi) characterizes the power of digital technology on fashion industry creating pervasive phenomenon in the contemporary society, (vii) deliberation and critical rumination on the fashion designer- a bridge between the technology and the consumer that prominence the socio-cultural changes globally, (viii) concludes "less is more" is a key guideline for smart fashion wearable (SFW) design and substantiates that designers will not succeed until it is designed from the fashion perspective – not as technology that can be worn, but as fashion design that contains technology.

*Keywords--*Fashion Design, Digital Technology, Aesthetics, Pervasive Phenomenon, Contemporary society.

I. INTRODUCTION

World of wearables (WOW) are the "next big thing". Wearable technology is a form of digital technology that gives a better sense of "intimate computing and communication (ICC)" which evokes a product that is sensual and tactile, personal and discreet. This new "intimate computing communication" age means Apple, as a firm, need to stop thinking like a computer enterprise and more like a smart fashion wearable maker, whose hallmark is not just indispensable aesthetics design but concocting desirous loving experience.

Wearable technology, as a digital technology, is available in its various forms, shapes, and changes person-machine interaction (PMI) with state-of-the-art features such as — voice activation, biometrics, cognitive-emotion recognition and gesture controls — that streamlines to fit the human body. The wearable operating system (WOS) enables the PMI, not the hardware and aesthetics. The WOS provides salient features of smart fashion wearables (SFWs) such as smart-apparels, smart watches, smart jewelries, smart bracelets, and smart gloves. At present, many wearable operating systems are available: Google´s Android and Android Wear, Samsung´s Tizen, Apple´s Watch OS, Media Tek's Link It. LG´s Web OS, and Tancent OS. Other WOS, soon to arrive in the market. The most important element of WOS is the kernel that sits between the software of the technology and the hardware. Most wearables use the Linux as the main stream kernel.

(https//www.Google.com; https//www.Apple.com; https//www.Samsung.com; https//www.LG.com; https//www./MediaTek.com; https//www.Linux.com; https//www.Tancent.com)

SFWs use embedded WOS to provide the following benefits – from fashion to fitness to fun:

(i)   Check the weather or set a reminder just by asking the smart watch.

(ii)   Get directions, check grocery list, and even pay the bills with smart watch.

(iii)   Stay in the moment with smart ways to text, email and see who's calling, without pulling out phone

(iv) Monitor workout without phone and stay balanced as well as track health right from your wrist.

Technological amelioration in the last five decades involves enrichment of wearable technology and wearable design techniques. The future of wearable technology is not just on your wrist or body but to expect to be invisible. They are reality into everyday lives and can change the evolution trends disrupting the fashion business globally. Cutting-edge digital technological enrichment in the digital age revolutionize industries like fashion shaping the tomorrow to re-imagine the future by transforming the realities of today The potential convenience, greater range of features and new technological innovations like artificial intelligence, block chain, cloud computing, 4D printing, smart dust, stretchable batteries, Pico technology, augmented reality, virtual reality, Internet of soft things, synthetic biology, and sartorial robotics seem to hint at a brighter future for smart fashion wearables. One should have a design philosophy not to leave any detail unnoticed because one never knows what casual day-to-day thing might become the next influential aspect of a new, groundbreaking design.

This study refers to smart fashion wearable (SFW) as smart textiles, e-textiles, smart watches, smart bracelets, smart pendants, jewelry, accessories for various applications in the fashion industry. In this era of leap change, one tends to easily adapt to the smart fashion wearables and the growth of SFW promises far more powerful and cost-effective in the days to come. Smart fashion wearables (SFWs) are the biggest innovation in digital technology that crosses boundaries between many disciplines and will not succeed as a market until it is designed from the fashion position – not as technology that can be worn, but as- "fashion logy" [1] fashion design that contains technology.

In this comprehensive review the terminology used surrounding the fashion design, the author has coined "Couture logy" [2] and the different terms related to couture, haute couture, fashion, fast fashion, ethical fashion, ethical cognitive couture etc. refers to the SFW phenomenon used interchangeably in this study.

II.　DESIGN IMAGINATION DEFINE POINT OF SIGNIFICANCE

Every design imagination is a process for the formulation of ideas and fulfilling the needs of a market. The design solutions must meet and solve customer problems through the lens of the firm's vision and mission. Design thinking should be guided by the following key elements as the foundation to create a solution to solve users' problems:

Strategy - Identifies the opportunity space (who, why, where) and must have calibration criteria.

Principles - Guiding values that outlines the attributes of a specific solution.

Pillars - The user experience structure that defines the solution's salient points of relevance. A good design is driven by human connection. Based on author's extensive experience as a product marketing practitioner, a good design

depends on the execution of the following six pillars, as shown in figure 1, to attain the best solution prior to design thinking process:

(i)　Empathy is the intimate connection with the consumer feeling to meet the need of the consumer compassion.

(ii)　Simplicity is ease of use to make things intuitively obvious.

(iii)　Craft is the aesthetics and quality to be carried from concept to consumer experience.

(iv)　Impute presents the fashion designers cohesiveness in a creative manner.

(v)　Friendliness is the biggest leap comes from user experience through intuitive plug and play.

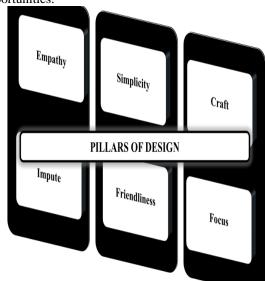*(vi)　Focus* is to eliminate all inconsequential opportunities.

Figure1. Pillars of Design

III.　DIGITAL TRANSFORMATION – A MINDSET THAN ABOUT TECHNOLOGY

No amount of digital technology can successfully change a firm; but with the right mindset, company's customer value creation, and sustainable competitive advantage is possible. Mindset is at the core of culture creation, strategy formation and management. The ramifications of the digital mindset enable fashion designers to lead and create cultures where empowerment, speed of execution, and learning are hallmarks of an organization including change in management for digital transformation. In the digital age, a fashion firm must begin with an appropriate mindset prior to deploying digital technologies. Big data is the new currency of digital technology era. Fashion design team must alter their mindset from a traditional view of data being expensive to manage. Legacy view of innovation is where testing new ideas was expensive, slow, daunting, and failure was to be avoided at all costs. This traditional mindset must change to view innovation in a

way to embark on testing ideas in the digital world is quick, inexpensive, easy, and where mistakes are learned early. In the legacy world, value was often defined and judged by the impact on business. In the digital world value is viewed within the context of customer needs and to uncover the future opportunity to create customer value. Thus, digital transformation of a fashion brand is more about mindset than about technology.

Digital technology and the fashion design process challenges the potential of digital interventions for fashion designers. The digital domain design requires access to practical tools, workspaces and digital skills development for designers to take advantage of underpinning the rise of the digital economy.

One needs to know the vision, mission, objective of the design and development process. Prior to incorporation of digital technology in fashion design, it is essential to understand the impact of technology on the design and development process. The intangible ideas must be converted to a product through technology, and manufacturing processes

The development of smart fashion wearables demands the merging of embedded wearable technology, aesthetics and fashion design. A wide gap still exists in the provision of designers with a common language to appreciate the disparate mix of aesthetic, beauty, style, taste, technical and cultural needs of the potential market for smart wearables. The design and development of smart fashion wearables´ crosses the boundaries between disciplines such as fashion design, digital technology, human biology, electronics, multimedia, interaction design and marketing. The `new´ smart wearable design discipline embraces creativity and aesthetic, style, beauty, taste awareness combined with a sound requirement for technical understanding and innovation. The most addressed needs and requirements of SFW design are: (i) customer parameter needs, (ii) materials requirements, (iii) technology parameters requisite, (iv) functional essentials, (v) performance & quality committal, (vi) design and an esthetics exigency, (vii) economical longing, (viii) standards and regulation compliance, (ix) sustainability.

Design and development process using specific strategy is to shape that intangible idea into a commercial product as shown in the following steps and figure 2:
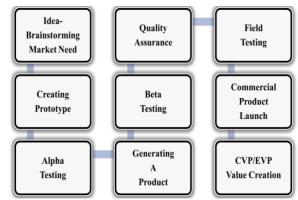

Figure 2. Design & Development Process for Value Creation

(i)   ***Brainstorming*** of possible ideas to meet the market need in an entrepreneurial spirit to come up with a new idea begins by defining the objective. Refining the idea takes time to develop, plan and test to make sure to reach optimal success. One can use various techniques to brainstorm a new idea or combine various techniques to attain the idea.

(ii)   **Creating prototype** is an early sample of a product ready for performing an alpha test of a concept to learned from and make sure the features, functions and performance meets the market need.

(iii)   ***Alpha testing*** is used for the first sample prototype test of a potential product. At the alpha testing phase, the prototype may have flaws with unfinished documentation and goes through iterations. The prototype variants may change certain features, functions and performance. The prototyping engineers fix the flaws and make necessary changes based on the test feedbacks. Once the alpha testing phase of the prototype meets the pre-determined specification and closely matches with the envisioned product, it goes to the beta testing phase after the quality assurance is attained.

(iv)   ***Quality assurance*** is a way of avoiding flaws and defects in manufactured products and systematically taking actions to enhance development cycles.

(v)   ***Beta testing*** is to evaluate customer satisfaction to ensure release readiness.

(vi)   Generating a product and get ready for field testing.

(vii)   ***Field testing*** at prospective customers locations to evaluate the adoption of the product.

(viii)   ***Commercial product*** - at this juncture, designers need to launch a commercial product to enhance the customer value,

(ix)   ***Customer Value Proposition/Effective Value Proposition/ Value Creation*** - The following steps are essential to improve the customer value:

- Focus on most valuable customers.
- Understanding what is important to customers.
- Meaning what drives value for customers.
- Discerning Customer Value Proposition.
- Creating more value relative to competitors.

The customer parameter needs are the Customer Value Proposition (CVP) that solves customer problem and satisfies customer need. In this sense, the CVPtest-driving offers a fruitful context for managers to involve frontline employees and use their creativity and expertise and is an aggregation of benefits that a fashion company offers to its customers. Hence, to devise an effective value proposition (EVP), one must understand the market from a compelling customer value proposition point of view. It is imperative to review and test the customer value proposition as an integral part of the design and development process.

IV. AESTHETICS ACTUALIZE USER BOND & LOYALTY

Fashion is a pervasive phenomenon. Fashion as a thriving multibillion US$ industry and to meet a broad spectrum of consumer needs, the aesthetic aspects of fashion is a compelling area for research. It is important to stimulate more research on the aesthetic aspects of fashion design. To that end, the author reviewing the aesthetics of fashion design.

Some fashion trends are nimble. Others stand the test of time. Aesthetics refers to sensory perception and sensuous knowledge. Aesthetic details are paramount to design for emotions. Aesthetics is the power of beauty, taste and style in design for one to feel in their senses and signifies making the first impression. This brings balance between the mercurial desires of customers and the needs of the society. Fashion designers look to various indicators and influences for new ideas of fashion, technology, and aesthetics. More than ever, fashion designers find that customers know what they want and aren't shy to ask for it.

Why one experience certain feelings as gratifying? The author argues, as per evolutionary psychology, that human beings aesthetically prefer materialistic features and patterns that are beneficial for the development of the senses for survival. The principles of aesthetic pleasure, in general, operating across the senses can be explained on the following basis: (i) paramount outcome for merest means, (ii) unity in assortment, (iii) most progressive, yet acceptable, and (iv) flawless match.

While some do not like digital technology's pervasiveness and impersonal influence, others want functionality and emotion driven aesthetics. Aesthetically pleasing designs concoct assuagement in the users and makes customers care more about the product and becomes loyal to the brand. When one perceives beauty with sense of deeper pleasure. Excitement happens from the start with the aesthetic design and makes the customers form a nexus that goes beyond the initial feeling. Aesthetic design also makes the first feeling long lasting and formulate the manacle with the customer. In general, customers are looking for more aesthetic value and are increasingly open to exploring creative possibilities to meet their needs. Considering the

above, the author has coined and introduces the 5C (comfort, care, convenience, context of usability, communication) experiences that are at the epi-center of aesthetic value creation for the SFW, as shown in the figure 3:
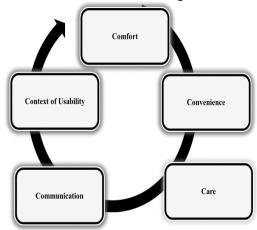

Figure 3. Five C experience at the Epi-Center of Aesthetic Value Creation

(i) Comfort - aesthetic contentment is the art of entwining level of ease effortlessly to create value.

(ii) Care - Aesthetic care is the combination of art, fashion, technology in a manner to offer reliability and safety in smart fashion wearables that rejuvenate health and wellness.

(iii) Convenience - In crafting customer experiences, the perception of convenience is as vital as the actual benefits of saved time and effort. Wearables offer convenience that connects to a smartphone using Bluetooth to provide alert to the user receives a call, SMS, and email. A lighting control system offers versatility, particularly the element of convenience with regards to light control (on and off) and to illuminate pathways throughout the fashion show.

(iv) Context of usability - Usability is minimalistic design.Aesthetics in the context of usability is concerned with the relationship between aesthetics, and ergonomics. It is directly correlated with usability because it affects the emotional state of users, which in return can affect users' interaction with the SFW.

(v) Communication – Personal sense of reality is built upon understanding of **communication. The art of human communication is profoundly important in an ever-changing technological society**. Wearable devices can replace smartphone and tablet to provide important message communication via aesthetic forms of expression that can influence cultural and social development.

Marketing is a conversation. Keeping customers engaged is a daunting endeavor. Creating a strong presence in the market requires innovative ways to communicate with new & existing customers. Branding is a marketing term to build and maintain brand identity. Brand loyalty is a customer behavior stencil where users repeat purchases over time. Fashion brands use ingenious marketing strategies to

build brand loyalty. The following are the few tips to maintain brand loyalty

(i)   Provide value
(ii)   Keep quality high.
(iii)   Engage with customers continually.
(iv)   Solicit feedback from customers.
(v)   Give the customers a reason to come back.
(vi)   Unceasingly innovation to stay relevant.

V.   FASHIONLOGY – AN ARRAY OFAMAZING ADVANTAGES

Cutting-edge technological amelioration in the digital age revolutionize industries like fashion shaping the tomorrow to re-imagine the future by transforming the realities of today. The digital technologies change the evolution trends disrupting the fashion business globally to offer the following amazing array of advantages transforming the fashion industry landscape:

Smart Jewelry– Ringly, a smart fashion wearable company, makes smartring fundamentally changing the perception of jewelry as a wearable. The company stands out as beautiful jewelry equipped with features that provides the following benefits to its customers:

(i)   Stay connected- Stay on top of what matters most.
(ii)   Track activity to maintain healthy life style, including meditation exercises

Created for women, the company helps women to live well and be happy through well-crafted jewelry, innovative digital technology, and a compelling customer experience(https://ringly.com/products/smart-ring).

Luminous fabric for fashion (Fiber optics Fabric) - Illuminated fabric commercially available with light and color for style for innovative fashion wearables and fashion show decorations. Plastic optical fibers can be seamlessly integrated into an apparel without generating heat and insensitive to electro-magnetic radiation. Optical fibers provide many functions in a smart wearable – aesthetic appeal, safety vests, transmit/receive data signals, transmit/receive light for optical sensing, perform chemical sensing, and detect deformation (https://www.amazon.com/fiber-optic-fabric/).

Sartorial Robotics is a design and development method of merging robotics and fashion wearables to facilitate interaction and mimic the fashion, aesthetics, and construction techniques of wearables assisting how to situate robotics in one's life enhancing the social aspects of robot - human interaction [3].

The wisdom of the cloud- Fashion designers can drive innovation and lower costs through cloud computing. Cloud computing is the application delivered via services online (Internet) and the system (software and hardware) in the data centers provide various services that enhances the competitiveness of the textile industrial clusters. Many see huge potential in reducing the cost of digital technology implementation to organizations and freeing them from the hassle of having to install and maintain applications locally. Like most advances in software these days, 3D design is moving into the cloud enabling to work directly in browser over a connection to the web[4].

World's first Smart Bra -ASan Francisco company – OM Signal has developed the OMbra, the worlds' first "smart" bra, to measure biometrics through a piece of garment and digital sensor technology that can be worn daily(https://www.omsignal.com/).

Augmented Reality (AR) is an experience that supplements the real world with a virtual layer of information. AR is more than a wearable device.It is a layer of connected services through high speed Wi-Fi, or WiMAX or optical networks. Since service design is important for fashion wearable experience, the design challenge is to connect existing products by a single service(https://www.apple.com/ios/augmented-reality/).

Virtual Reality (VR) fabric Headset–When one thinks about virtual reality (VR),fashion is not something that immediately comes to mind.VR is used by the fashion industry in the following ways:(i) 3D avatars (virtual humans) to help with clothes design, (ii) Fashion show - a 3D image was projected into a real-world setting, i.e. a catwalk as part of the show, and (iii) 3D fashion portfolio (https://vr.google.com/).

An Internet of Soft Things (IoST) brings together person-centered psychotherapists with garment designers to ask how networks of apparel can benefit to support improved perceptions of mental wellbeing (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6077937/).

Machine vision- Nowadays a machine vision system can track how fashion spread through society facilitating the first hard evidence and can classify fashion trends that happen from one season to the next. Machine vision techniques demonstrate the trends in fashion shows influence street-chic outfits that appear afterward [5].

5/3nm logic platform technology–Nowadays semiconductor companies start to ramp up 10nm/7nm logic technologies for various fashion design applications. For many years, the semiconductor industry has been working on a cutting-edge technology for chip production at 5nm and beyond. The 5nm logic design and manufacturing process node is quickly happening. 5nm logic platform technology is being commercialized and applications is in the pipeline for the fashion industry. 5nm logic platform will enable fashion designers to design seamless ultra- integration to achieve true comfort, and aesthetics with high performance fashion smart wearable for health, sport, and military applications. The 3nm logic technology may not follow the same vectors for semiconductor chips to roll out at some point in the future for various applications of smart fashion wearable (https://www.semiwiki.com/forum/content/7544-7nm-5nm-3nm-logic-current-projected-processes.html; https://semiengineering.com/tag/3nm/).

Smart Dust- The idea is that one can have something that's as small as a piece of dust with some intelligence built into it so that it could be inconspicuously stuck to paint.Smart dust refers to little things called "motes" offers insight into new directions in digital technology. Smart dust can monitor bar code, surface treatments of fabrics and other applications of smart wearables [6].

3D/4D Printing- In 2006, laser sintering technology was developed to create three dimensional (3D) objects. Two years later, the first self-replicating 3D printer was introduced creating 3D objects layer by layer and have been used to manufacture fashion wearables, robotic aircraft, prosthetics, and automobiles. The 4D printing is the next-gen fabrication process encoding of "a dynamic capability--either function, or properties--that can change via the application of chemical, electronic, or Nano materials. 4D printed kinematics wearables were introduced in 2015 and is applied for piracy protection for the fashion industry. (http://digicult.it/news/computational-fashion-e-stampa-4d-il-lato-glamour-del-fabbing-e-della-biologia-sintetica/).

The following range of opportunities 4D printing technology bring to the fashion world:

(i)   Shape and function of sneakers can change according to consumer need and usage (running, walking, jumping, etc.).

(ii)   Wearables (Apparels, Jewelry, and Watches) that can adapt to the form of the body, change color and properties depending on the environment (weather, danger, etc.)

(iii)   Jewelry parts that are 4D printed, self-assembled, and automatically adapt to the form of the body.

(iv)   Apparels are printed in one piece despite being much larger than the space inside the printer and conform flexibly to the body.

Example: Nervous System, a design studio, has experimented with this new technology and has created Kinematics, a software tool for 4D printing that addresses mass-market production. (https://www.dezeen.com/2016/03/08/nervous-system-4d-3d-printed-kinematic-nylon-petals-dress-fashion/)

Pico technology - The term Pico technology is intended to parallel the nanotechnology term. It is on the scale of trillionths of a meter or Pico scale ($10-12$). Pico particles are envisioned increasingly to be used as coatings on clothing to make it waterproof, microbicidal, UV-blocking or antistatic. In future, fabrics made from Pico fibers, with Pico particles and Pico filaments an integral part of the weave. A new era of " smart" fabrics could automatically respond to one's body and the environment around someone. The seamless integration in the Pico technology is possible for ultra-thin electronics functions in textiles that combines fashion and electronics [7].

Ubiquitous printed electronics - In 2016 Oregon StateUniversity(USA) researchers introduced a novel, relatively affordable, low-impact method to printsolar cells using an inkjet printer. The printed electronics market has seen exponential growth. By 2020s it will be introduced into the mainstream market – creating a new generation of ultra-thin electronics. Nowadays,these have such low fabrication costs that they are ubiquitous in countless everyday business and consumer applications including fashion wearable design [8].

Graphene materials- Discovery of graphene and its astonishing properties have given birth to a new class of digital materials known as "2D" materials. This wonder material is flexible, transparent, stronger than steel and more conductive to electrical charge than silicon graphene. 2D materials are emerging in a wide range of applications including new generations of wearables and batteries [9].

VI.   DIGITAL TECHNOLOGYHATCHPERVASIVENESS

Pervasive technology is the study of how technology affects interactions with the socio-cultural ecosystem and economic environments. Digital technologies are considered pervasive technologies since they impact day to day lives of the global community. They can be utilized by its denizens to enhance the quality of their work and life. Such hypothesis enables social and technological interactions in sync to affect day-to-day lives form the foundations of pervasive phenomenon and propagates throughout the contemporary society.

The digital technologies provide the following myriad of applications that creates pervasive phenomenon in the society:

Pervasive web-based learning - The integration of mobile learning with pervasive computing offer inordinate innovations with a vision to delivery of online education spawning the pervasive phenomena in the coming years of the 21st century. While pervasive technologies, such as mobile phone, has contributed to increased productivity with pervasive phenomena, their nature can become technology addiction. On the other hand, the growth of digital technologies has transformed the area of learning. Even though the traditional form of learning exists today, there is a growing expansion of Internet (Web) and mobile based learning. Since Internet is ubiquitous and pervasive, it provides the learners to access the learning sources from anywhere, at any time and anything. Thus, the integration of pervasive computing and mobile learning technologies enriches the lives of people in the contemporary society with a pronounced learning experience.

The fusion of couture, technology and aesthetics- The author has coined and defines the term "Couturelogy" as the fusion of couture, aesthetics and digital technology.

Couture is often applied to wearables within a specific time context and understood as key to the context of aesthetic response. The form of a wearable is a distinctive arrangement of shapes, lines, textures, and colors. Understanding form

means attending to details and the character of the details. Since couture phenomenon is global, there is a universal need for discerning aesthetic experience.

Aesthetics of dress contributes to quality of life and is about how people choose to appear within a specific context. Aesthetics is also the reaction of pleasure and satisfaction derived from human emotions and sensations through experiences of sight, touch, hearing and taste. Context is vital in the study of aesthetics. Aesthetics involves understanding value and is essential to understand because if fashion design does not please aesthetically, consumers may not buy to wear it. Aesthetic criteria mean exploring the patterns and attributes of a wearable that offers meaningful experience and reflects a perception change. It is important to note that aesthetics is linked to the experiences and values of a society at a specific time. Contemporary aesthetics concept occurs when fashion design is recognized unceasingly the evolving nature of couture.

Recent digital technology development in the fields of information communication technology (ICT), wearable technology (WT) and cognitive technology (CT), Internet and other technologies provide the competitive edge for many new fashion firms to attain growth affecting day to day lives of the global community. However, technology itself is not an innovation. The match between technology and the market need to create customer value is the path to innovation. It is essential to discern technology driven innovation may manifest in many forms. Technology is evolving constantly, therefore, the fashion firms need to embrace technology evolution. It is the efficient management of this evolution process with knowledge and experience of the firm creates the fashion firm's success.

Blockchain facilitates transactions in a fraction of a second - "Block chain (BC)" is an emerging distributed ledger technology (DLT) that maintains a continually growing list of transactions or records called blocks. Each block contains a timestamp and a link to a previous block. It can process transactions in a fraction of a second streamlining the process to enhance transparency as well as provide security to fashion enterprises.

Big data and Predictive analytics manage stakeholder relationship effectively - Bigdata is like a diamond mine and every transaction with stakeholders lays the valuable opportunity of information that can be analyzed to improve every aspect of service provided for relevant stakeholders.

In the digital universe, big data is the new adjuvant. Industries need to leverage big data to understand better for sales, marketing, customer service, and customer risks to capitalize on new market horizons. When an industry becomes more and more commoditized the quarrying of big data represents vast opportunity for the companies to be distinct from the competition and outperform the competitors. The predictive analytics enables companies to better manage their relationship with various stakeholders in managing the business. Furthermore, the firms will be able to enhance customer self-help via greater access of data that can

interface with enterprise resources planning (ERP) system and run the predictive big data analytics across the working capital required (https://www.syspro.com).

Pervasive technologies breed pervasive marketing phenomenon- Cross-pollination of the pervasive technologies, business intelligence and predictive analytics is a pervasive technology system [11] enable disparate cultures to conspire more competently in every rondure and bring global community of stakeholders and organizations closer together. By allowing to happen unprecedented access to informing systems, technology is changing user presumptions. Technology evolution in the Internet domain is aggregating strength as continual innovation connects billions of devices into pervasive technologies systems (PST). The application of pervasive technologies (ICT, CT, BC, AI, CC, IoT, and other technologies) for fashion brand marketing, sales and service presents enormous opportunities and challenges for the 21st century. The choice should be in a constructive and gainful direction. This is a digital world in which pervasive technologies accomplish affirmative potential through promotional marketing inducing the pervasiveness in the society. Such promotions are called pervasive marketing promotion which plays important and necessary activities in the fashion venture business development. Without pervasive marketing promotion, some firms would not thrive or even survive. Pervasive promotional marketing of pervasive technologies to relevant stakeholders, particularly consumers, play a key role inducing the pervasiveness in the society, as shown in figure 4.
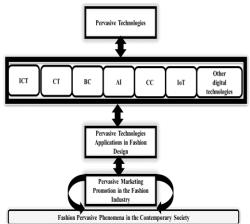

Figure 4. Pervasive Technologies Creating Fashion Pervasive Phenomena in the Society

Most marketing professionals are unaware of recent advances in pervasive technologies, the opportunities they offer, and the challenges they pose. Similarly, many pervasive technology researchers and professionals are on top of the recent technological advances but lack basic marketing and advertising expertise. This research highlights this gap.

VII. DELIBEARTION AND CRITICAL RUMINATION

Habitual behavior is often hard to change. Digital technologies facilitate self-monitoring by delivering feedback on habitual behavior. This review focuses on the following discussion and critical reflection:

(i) fusion of fashion design, digital technology and their jounce on the social capital and practices of the contemporary society.

(ii) Fashion and Socially controlled emotion.

(iii) Fashion and person to machine interaction

(iv) Fashion and the information society.

(v) Fashion models immortalizing the society.

(vi) Fashion and environmental degradation

Social Capital and Digital Technology - Social capital is described as the value of relationships among people in a society, enabling society to function effectively. The digital divide has created the socio-economic disparities in the contemporary society. Digital technologies are changing the way people engage with each other and has changed the concept of community. For some, making connections has become easier, but others say that life has become more isolated. Literature shows that relying on social media for friends doesn't make one happier. The neighbor who lives two doors away statistically may create one's happiness than on social media.

Today, the world is facing continual technology disruptions. One can swipe a touch screen to connect with products, people, and information ubiquitously globally. It seems people are in danger of disconnecting from their own communities. The concern is people increasingly live through a digital revolution in communications and computer technology evoking comparisons to a natural upheaval. Substantial minority of adults globally are concerned regarding ever-increasing reliance on digital technologies costing jobs, undermining local vendors, fraying communities, disrupting families, and unsettling too many aspects of life. Young and old recognize the problems that the new digital technologies are creating, even when they celebrate and welcome the digital world to usher in. With respect to negatives of digital technologies, people seem to be more uninvolved or less gregarious- less family time, since younger generation and millennials are deeply involved with their digital devices compared to decades ago. Most of the older generation don't think technology is the real solution for the society, since it takes away the eye contact and communication between people. The implications of digital technologies are pervasive are greater among older citizens globally.

Nowadays, it's more of technology-to-person than of person-to-person (face to face) contact. Example – addiction of using the smart phone. The negative aspect is the quality of life by isolating people from their neighbors and local businesses, and by weakening the sense of community in neighborhoods of the contemporary society. The impact of digital technologies on children interacting with family and friends, parents express more ambivalence about these changes.

With respect to the merits of digital technologies, the information is at one's fingertips. The explosion of digital technologies and connectivity has done more to connect than to isolate people globally and will continue to enhance people's lives. Example- Google search. Or if one need directions, use the Google map. Overall, it's positive. The digital revolution is improving quality of life by making it easier to keep in touch with like-minded people from around the world and to purchase products from anywhere conveniently. Aesthetics design supports social interaction and social events in the best way possible. Example – pleasure derived from completing a task through Virtual Reality (VR) experiences. This context is related to the usability of the product design. The new opportunity of virtual existence has important social and psychological jounce.

Fashion and Social Practice - Fashion is influenced by cultural and social attitudes. Design considerations with social problems need multidimensional responses, informed knowledge, and competent practices that is "out of the box thinking". The fashion industry can shape and reflect social practice. Research suggest developing a new strand to explore a better understanding of the individual values to the represent fashion's social practices. Development of social relations that positions consumer at the center of the design process as a means for communities to contribute to social and environmental practices. There's definite value in life logging via pervasive technologies, so one unlikely to reject it completely. Social technologies are much greater than a consumer pervasive phenomenon. The social matrix stretches beyond the co-creation of value in the products and services. Social features can become an integral part of communication that can be embedded in products, services, business systems and markets. As a social media company Facebook gadgets, portal and portal plus are meant to bring people together, but the portal has raised privacy concerns particularly when Facebook has a demonstrably worst record on privacy. Thus, the digital revolution is certainly undermining the sense of social practices of the local communities and neighborhoods

Fashion& Socially Controlled Emotion - Fashion is a mindset and an unadulterated mode of socially controlled emotion, and cognitive behavior. The relationship between cognition and emotion has fascinated intellectuals and creative thinkers. Historically, emotion and cognition have been viewed as largely separate disciplines. Last two decades, however, increasingly research work has gained importance to the interdependence between cognition and emotion. The psychology of fashion explores how wearables can affect cognitive processes. Emotions affect cognition's and when emotions are strong, human cognitive functions are profoundly affected. The art of ethical cognitive couture is all

about conception of stories and emotions. Emotions have an excellent sense of couture and is an effective aspect of consciousness and a strong sensation. One 's couture may alter how one approach and interact with the world. It's no secret that designing a couture is like selecting social sheath. Wearing couture has power over others. Remarkable stories make famous brands and create an emotional connection that breed excitement in people. The power that comes from stakeholders gives the brand meaning, context, and relevance to ensure valuable. If one has a strong cultural association with haute couture, wearing it can affect cognitive processes. The author refers to this phenomenon ―couture cognition-haute couture 's unheard voice. Couture as a language one uses to express oneself to others. Each piece of couture is a word and these words together form a sentence that provides information about who one is?

The cognitive system (CS), as shown in figure 5, IBM collaborative innovation platform for cognitive era, for the haute couture business brings the couture trends in couture information systems and insights to support couture business process operations, e-commerce platforms, and enterprise resources planning to drive and sustain innovation. Cognitive system does not replace the creative process. They are proving to enhance and accelerate it. While trends fade, new creative ideas inspired by unique combinations of those trends are timeless. The following potential business benefits of cognitive system are much broader than just cost savings: (i) faster actions and decisions, (ii) better results in terms of creativity, (iii)higher efficiency, (iv) greater scale, (v)innovation in cognitive dresses and service, and (vi) lower costs (reducing labor costs and faster execution with automation, (vii) better performance, and (viii) increased capacity/flexibility.
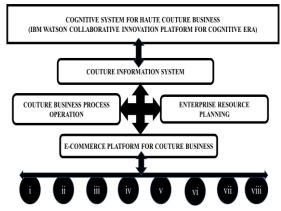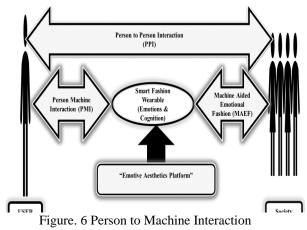

Figure 5. Cognitive System for Haute Couture Business

Cognitive couture market opportunity is emerging, and the field of study crosses boundaries between many disciplines related to fashion creation, fashion design, cognitive technology (CT) like IBM Watson technology, and aesthetic. Such technology is not just a state-of-the-art technology, but the dawn of a new era called the Cognitive Era- creating various kinds of technological, scientific and

societal challenges and opportunities effecting every day to day to day life. The author contends that IBM Watson`s cognitive system interacts with seven human key emotions (joy, comfort, passion, excitement, inspiration, encouragement and curiosity) to suggest and identify color palettes that matches with the desire of a couture brand to achieve sustainable co-creation value for the haute couture market and for better emotional experience of the cognitive dress[11].

Fashion - person to machine interaction - In contemporary culture one of the functions of fashion is an interface between the individual and society.Early published literature on the fields of wearables, and digital technologies have shown that smart fashion wearables would have a strong impingement in the fashion industry to fabricate human second skin replacing the traditional wearables. A transition from a technology-driven solution to a human-driven product can make the e-second skin[12] of the e-garments for a mass market

The overall concept of integrating human–machine interaction, SFW, aesthetics , and communication between a person and society is represented in the Figure6, and the following interaction takes place: (i) person to person interaction (PPI)—between a user and society, (ii) person to machine interaction (PMI)—between the user and the digital device, and (iii) machine aided emotional fashion (MAEF)— the potentially powerful communicator/ interface between the garment and society.

Figure. 6 Person to Machine Interaction

Motion facilitates a plush modality of emotion communication initiating influence, and advancing techniques for enriching, shaping, and analyzing animations. Perceptual idiosyncrasies of motion dispense to emotive interpretation. Research shows motions can effectively arouse certain impressions given specific motion features contributing to one's understanding of "emotive aesthetics platform" [13].

Fashion and the information society - The connection between technology researchers and fashion industry is a growing phenomenon. The assimilation of digital technologies in fashion design marks a great leap forward.

Pervasive technologies promote the idea that embedding digital technologies into the fashion ambiance would enable people to move around to interact with various forms of digital technologies more instinctively than they currently do. Pervasiveness offers the possibility to people of physically unavailable regions to access further services and give people the illusion of control of the circumstances. Ubiquity and availability enabled by pervasive technologies open the opportunity for human race to go beyond time and geographic circumspection. In the ambience of a global pervasive digital society (PDS), computing has become a basic science for different human activities. Ubiquitous computing addresses to the opportunities to have processing resources everywhere. Pervasive computing is the next generation computing ecosystem with information communication technology (ICT) for everyone, everywhere and at any time. The above initiatives enable and enhance the possibility to incorporate global information systems. Thus, creating information societies. This new "reality" will specifically quiver psychological, social, and economic conditions of the contemporary society.

Fashion models immortalizing society - Fashion models have taken the accusation for the ideal eternized by the business. However, if they do not ambit the exemplary, they won't survive in the fashion business. Recently some consumers are recognizing that the ideal perpetuated by the fashion industry do not reflect the common person on the street. This move by a few courageous fashion stakeholders may change the face of the society. Unfortunately, one of the problems the contemporary society is facing the creation of celebrity status. Until the society change the perception of celebrity status, fashion industry will be eternalizing impact on the society.

Fashion and environmental degradation - The apparel industry is the world's second biggest global polluter. Fast fashion [14] is cheaply discarded clothing that spirals into ever quicker production cycle making environmental degradation. Production process of cotton is one of the highest water exhaustive crops – responsible for high volume of global water use. Furthermore, it is highly dependent on high volumes of fertilizers to increase the output. The use of such chemicals imparts pollution to the ground water, air and soil fertility encouraging unsustainable consumption. This is due to a complex global supply chain and production process which mainly includes cotton farming, dyeing, bleaching, fibers manufacturing and printing that consumes high energy. Unfair manufacturing process conditions and an ever-growing demand-driven fashion industry causing substantial eco-logical damage. Hence, Ethical fashion smart wearable [15] for the society is imperative to undertake an impelling role in poverty depreciation, sustainability creation, minimizing and preventing environmental concerns.

VIII.   CONCLUSION

Fashion is an extension of one's self identity and it talks in a downplay whisper, or wink and a smile. After all fashion is about converting self-esteem into a personal style revealing to impact contemporary society. Fashion cycle nowadays largely driven by Internet. By the time a certain style created a hysteria in the market, fashion designers start creating a new set of "looks". This impacts the fashion cycle driving cut throat competition. Recent digital technological advance has significant quiver on fashion e-commerce and fashion retail business. In fact, technological innovations have unceasingly delivered profound advances in the smart fashion wearable industry. Thus, fashion and branding have become pervasive in the contemporary society at large.

Gap in digital skills isn't going to be a replacement for craft-based design practices. It should be more about how it can enhance what one wants to achieve. The innovation challenges for fashion designers in the digital era are diverse, from programmable textiles, designing intuitive user interface, search engines utilizing metadata based upon images rather than text, to virtual reality, augmented reality user experience design, and 3/4D printing technology. A new language for textiles is emerging: combining the real and the virtual. The shift in the textiles, electronics and digital technologies sector will give rise to the area of smart wearable and clothing that provides aesthetic experience. Given the vision of dematerializing information communication technology (ICT), and the fact that much of one's living environment is made up from textiles, the ICT industry is now expressing keen interest in fashion wearables.

Fashion companies set a vision for the next season, and everyone follows on that vision. No one could predict decades ago that more than 20 million people would buy a smart watch by 2018 that reads text messages, checks the weather and tracks workouts. But that's exactly what happened. A new era in fashion wearable is emerging which will create super wearables with emotional experiences through technology. Based on author's four decades experience in ICT and fashion wearable technology business, to be a smart wearable brand it's all about prepping and aligning one's intentions and expectations. Furthermore, prior to the SFW design process, it is vitally important to ensure the right product market mix and customer value proposition requirement.

Moore's Law [16] contends that as components get smaller, products gain efficiency and become more powerful. Future wearables could be more hidden by adding a thin film inside your favorite jewelry to measure biometric data, and activity levels. Wearables are going to be a part of the fashion jewelry legacy, and they should be thought of as both as a smart gadget and a fashion statement. Alternative forms of energy to power wearables are on the rise and energy advancements require more polish to achieve commercial viability. Industry standards need to emerge to set

manufacturer guidelines and advocacy on consumers' behalf. Peoples' interests evolve; therefore, wearables need must evolve too. There is indeed a wearable future ahead to become the next big thing, one that can dramatically alter the landscape of society and business as we know it. The impact of wearable technology on society could be huge, and this is only a hint at the changes it could usher in.

Consumers need to behave as responsible actors in fashion. Consumer social responsibility is as important as corporate social responsibility. In the broadest form, consumer social responsibility isthe conscious and deliberate choice to make personal and moral beliefs. Effective communication should not only make consumers aware of your product's social features, but also educate them about how such choices are better for them, independent of the benefit to the society. This view is not theresponsibility of fashion brands to make people "concerned" about social issues, but rather to incentivize them the opportunity to reveal their true social preferences.

For the digital world, minimalism has been on wearable design trend for the last few years and will continue to remain so. Minimalist design is both appealing and flexible for every wearable platform simply because the design does not overdo. It has been observed that often designers over-stylize a design just to impress the customers. However, what is required is smart design and crafting a design that allows the content to take the center stage. Designers should permit broad network of structures and the wearable devices be allowed to broader techniques upon which they are based to interfacing with one another. In executing a wearable solution, one should eliminate most of the problems than it introduces to one's life. So, when wearable interfaces are designed, latency should be avoided."Less is more" is a key design guidelinefor SFW design and designers will not succeed until it is designed from the fashion position – not as technology that can be worn, but as fashion design that contains technology.

State of the art academic research relevant to the market need is essential for the smart fashion wearable. To date academic research on digital technologies to meet the market need for SFW has come up short. To be truly useful, usable and desirable for people, it is important to see the future improvements in user centric and application oriented wearable technology research.

Innovators around the world are embarking on new frontiers in digital technology that will alter the lives of the human being profoundly. People are over reliant and over indexing on technology to solve all the problems.Technology cannot solve all the problems of humanity. The author contends that both policy-makers and visionary technologists should embark upon pinpointing the next great "General Purpose Technology" that will be pervasive in nature in the society and keep pace with the global sustainable development.

REFERENCES

[1] Rauschnabel, P.A; Hein, D.W.E ; He, j; Ro, Y. K ; Rawashdeh, S; &Krulikowski, B. (2016). Fashion or Technology? A Fashnology Perspective on the Perception and Adoption of Augmented Reality Smart Glasses, I-com-Journal of Interactive Media, 15, 2, 179–194. doi: https://doi.org/10.1515/icom-2016-0021.

[2] Padhi P.K. (2018, p.148). Towards a Sustainable Value Co-Creation Framework: Ethical Cognitive Couture, Cognitive System, and Sustainability, International Journal of Engineering and Management Research, doi.org/10.31033/ijemr.8.4.17

[3] Whiton, A. (2013). Sartorial Robotics is a method of merging fashion theory and robotics. Thesis on Sartorial Robotics, Media, Arts & Science, Massachusetts Institute of Technology, Cambridge, MA. Retrieved from http://robotic.media.mit.edu/portfolio/sartorial-robots/

[4] Zhang, Q; Cheng, L; & Boutaba, R. (2010). Cloud computing: state-of-the-art and research challenges. Journal of Internet Services and Applications, 1, 1, 7–18.

[5] Dema, M; Turner, C; Sari-Sarraf, H; & Hequet, E. (2016). Machine Vision System for Characterizing Horizontal Wicking and Drying Using an Infrared Camera.IEEE Transactions on Industrial Informatics, 12, 2 ,493 – 502, Retrieved fromhttps://ieeexplore.ieee.org/abstract/document/7377070, doi: 10.1109/TII.2016.2516441

[6] Prabhu, B; Balakumar, N; & Antony, A.J. (2017). A Novel Leach Based Protocol for Distributed Wireless Sensor Network. IJIRT, 3, 8. Retrieved from https://ee.stanford.edu/~jmk/pubs/jcn.00.pdf.

[7] Sharma, R; Sharma, A; & Chen, C. J. (2011). "Emerging Trends of Nanotechnology towards Picotechnology: Energy and Biomolecules". Nature Proceedings. doi: 10.1038/npre.2010.4525.1Retrieved from http://precedings.nature.com/documents/4525/version/1).

[8] Bort, J. (2011, July 15). 10 technologies that will change the world in the next 10 years. Retrieved from http://www.networkworld.com/article/2179278/lan-wan/10-technologies-that-will-change-the-world-in-the-next-10-years.html(https://arxiv.org/ftp/arxiv/papers/1311/1311.2158.pdf).

[9] Gupta, A; Sakthivel, T; & Seal, S. (2015). Recent development in 2D materials beyond graphene, Progress in Material Science,73,44-126 Retrieved from https://www.sciencedirect.com/science/article/pii/S0079642515000237)

[10]Padhi, P. K. (2018, p. 96). A quest for born - Global speculative start-up: Pervasive Phenomenon Model. Informing Science: International Journal of Community Development & Management Studies, 2, 87-103. Available at:
https://www.informingscience.org/Articles/v2p087103Padhi4416.pdf

[11] Padhi P.K. (2018, p.137). Towards a Sustainable Value Co-Creation Framework: Ethical Cognitive Couture, Cognitive System, and Sustainability, International Journal of Engineering and Management Research, doi.org/10.31033/ijemr.8.4.17

[12] De Acutis, A; & De Rossi, D. (2017). e-Garments: Future as "Second Skin"? Smart Textiles, 383-396.doi 10.1007/978-3-319-50124-6_17

[13] Goulev, P; Stead, L; Mamdani, E; & Evans, C.(2004). Computer Aided Emotional FashionComputers &Graphics, 28, 5, 657–666. http://dx.doi.org/10.1016/j.cag.2004.06.005.

[14] Stone, E & Farnan, S.A (2018); The Dynamics of fashion, https://books.google.com/books.

[15] Padhi, P.K. (2017). Valuation and Inception of Ethical Fashion Smart Wearable Born-Global Speculative Start-up (BGSS). Informing Science: International Journal of Community Development & Management Studies, 1, 117148, Retrieved from: http://ijcdms.org/Volume01/v1p117-148Padhi4125.pdf

[16] Schaller, R.R. (1997). IEEE Spectrum, 34, p. 52-59, doi: 10.1109/6.591665

BIOGRAPHY

Prafulla Kumar Padhi, as a serial entrepreneur, has over 42 years of global business experience and held the Founder, CEO and Chairman of the Board positions for more than 25years and managed up to US$1.2 Billion revenue operations. His education qualification includes a Master of Science degree from the prestigious Massachusetts Institute of Technology (MIT), Cambridge, USA and a graduate of the Ivy League Wharton School of Business, University of Pennsylvania (USA) and holds seven diploma certificates from the Ivy League Columbia University (USA), the Ivy League Dartmouth College (USA), and Kellogg School of Management (USA). For more than 40 years, as a pioneer, Mr. Padhi has been involved in entrepreneurial venture endeavors in disruptive technologies and smart fashion wearable ventures globally. So far, he has done business in 46 countries and travelled to 142 countries. He is an author, independent researcher, innovator, pioneer, product marketing architect (patent/copyright holder) and teacher in creation, design, marketing disruptive technologies and products.