



## **Book of Abstracts**

### **2<sup>nd</sup> Digital Fashion Innovation E-symposium**

28-29 June 2021

<https://fashioninstitute.mmu.ac.uk/dfi2021/>

#### **Chair:**

Dr Abu Sadat Muhammad Sayem *CTex FTI*

Manchester Fashion Institute  
Manchester Metropolitan University

Telephone: +44 (0)161 247 2673

E-mail: [asm.sayem@mmu.ac.uk](mailto:asm.sayem@mmu.ac.uk)

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Professor Ningtao Mao, *University of Leeds*

Professor Yordan Kyosev, *Institute of Textile Machinery and High Performance Material Technology (ITM), Dresden University of Technology*

## Programme

28 June 2021		Day 1
GMT	BST	Session 1A: Chair - Dr. Abu Sadat Muhammad Sayem, Manchester Fashion Institute, MMU
12:00	13:00	<b>Welcome by Professor Liz Barnes, Manchester Fashion Institute</b>
12:05	13:05	<b>Introduction by Ms. Stephanie Dick, CEO, The Textile Institute</b>
12:10	13:10	<b>Introduction by Dr. Abu Sadat Muhammad Sayem</b>
12:15	13:15	<b>Keynote - Professor Ningtao Mao, University of Leeds, <i>Digitisation of fabric tactile features for the communication of fabric touch feel in textile supply chain</i></b>
12:35	13:35	<b>Q &amp; A</b>
12:40	13:40	<b>Jan Tepe, The Swedish School of Textiles, University of Borås, Sweden, <i>Digital Fashion Innovation from the Perspective of Artistic Design Research</i></b>
12:55	13:55	<b>Md. Mazharul Islam, Northern University Bangladesh, <i>Virtual Fit of Bodices Constructed by different Contemporary Methods</i></b>
13:10	14:10	<b>Q&amp;A for last two presentations</b>
13:15	14:15	<b>Break (10 minutes)</b>
GMT	BST	Session 1B: Chair - Dr. Patsy Perry, Manchester Fashion Institute, MMU
13:25	14:25	<b>Emma Grain, Leeds Arts University, UK, <i>3D Digital Fashion Design &amp; Prototyping Towards a Sustainable Fashion Future</i></b>
13:40	14:40	<b>Karen Lea-Swain and Victoria Markham, Manchester Fashion Institute, Manchester Metropolitan University, UK, <i>Is PLM The Existing Solution to Post Pandemic Fashion Business Digitisation?</i></b>
13:55	14:55	<b>Q&amp;A for last two presentations</b>
14:00	15:00	<b>Courtney Chrimes, Manchester Fashion Institute, Manchester Metropolitan University, UK, <i>Understanding How Female Body Shape Impacts Garment Fit Satisfaction</i></b>
14:15	15:15	<b>Fatma Baytar, Cornell University, USA , <i>Perception of garment fit in different colour lightness and body shape conditions</i></b>
14:30	15:30	<b>Q&amp;A for last two presentations</b>

\*N.B.: GMT = Greenwich Mean Time, BST = British Standard Time

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29 June 2021		Day 2
<b>GMT</b>	<b>BST</b>	<b>Session 2A: Chair</b>
10:00	11:00	<b>Hilde Heim, School of Design, Queensland University of Technology, Australia,</b> <i>Dress Block: The challenges of blockchain adoption for the circular economy</i>
10:15	11:15	<b>Claire Evans, Fashion and Textile Department, University of Huddersfield, UK,</b> <i>Digital personal shopping – Exploring innovative customer experiences</i>
10:30	11:30	<b>Sophie Johnson, Birmingham City University, UK,</b> <i>Brand v Consumer: Who has the power in fashion crisis management?</i>
10:45	11:45	<b>Q&amp;A</b> for last three presentations
10:55	11:55	<b>Break (65 minutes)</b>
<b>GMT</b>	<b>BST</b>	<b>Session 2B: Chair - Professor Alhussein Albarbar, Professor of Sustainable Engineering, MMU</b>
12:00	13:00	<b>Keynote - Professor Yordan Kyosev, Institute of Textile Machinery and High Performance Material Technology (ITM), Dresden University of Technology,</b> <i>'High speed body scanning for realistic moving avatars</i>
12:28	13:28	<b>Q&amp;A</b>
12:35	13:35	<b>Sadia Idrees, Department of Materials, University of Manchester, UK,</b> <i>A study of Prevailing 3D Body scanning Mobile applications: A contact-free Body measuring solution for mass-customisation approach in fashion e-commerce environment</i>
12:50	13:50	<b>Ni Zeng, School of Materials, University of Manchester, UK,</b> <i>The influence of technology-enhanced store atmospherics on customer engagement in luxury fashion retail: a conceptual framework</i>
13:05	14:05	<b>Q&amp;A</b> for last three presentations
13:10	14:10	<b>Break (10 minutes)</b>
<b>GMT</b>	<b>BST</b>	<b>Session 2C: Chair - Dr Helen McCormick, Manchester Fashion Institute, MMU</b>
13:20	14:20	<b>Anita Mitchell, , Manchester Fashion Institute, Manchester Metropolitan University, UK,</b> <i>The Door to the Digital World</i>
13:35	14:35	<b>Maria Nikoletta Chatziathanasiou, Creative Design &amp; Clothing, International Hellenic University, Thessaloniki, Greece,</b> <i>How can fashion industry use XR technology to the customer's added value experience</i>
13:50	14:50	<b>Liru Jiang, School of Materials, University of Manchester, UK,</b> <i>Comparing the effects of 'showing available product' and 'showing unavailable product' by social media influencer for luxury fashion brands</i>
14:05	15:05	<b>Q&amp;A</b> for last three presentations

\*N.B.: GMT = Greenwich Mean Time, BST = British Standard Time

You may use World Clock at [GreenwichMeanTime.com](https://www.greenwichmeantime.com) to check your local time. Below figure shows the time differences from GMT in few cities in different continents and the local times in those cities at the starting time (i.e. 12:00 GMT) of each of our sessions.

# Abstracts

# Digital Fashion Innovation from the Perspective of Artistic Design Research

J. Tepe

*The Swedish School of Textiles, University of Borås, Sweden*

**Key Words:** Extended Reality Fashion, Future Fashion, Fashion Education, Hybrid Fashion

## 1. Research Gap Identified

Research in fashion with regard to digital innovations is mainly concerned with the improvement of digital prototyping processes for garment constructions or the accurate representation of human bodies and textile materials in digital spaces [1, 2]. While research in this respect is necessary, it mainly covers a segment of the fashion system as a whole as it is primarily concerned with industrial needs. Artistically inclined designers and institutions of fashion design, who seek to find alternative possibilities to design and experience dress, equally benefit from research inquiries that aim to find transformative potentials of digital technologies for their practices [3]. It is thus necessary that future research in fashion also consider the needs of these designers and institutions, to contribute to a holistically developing fashion system concerning digital innovation inputs.

## 2. Aim and Objectives

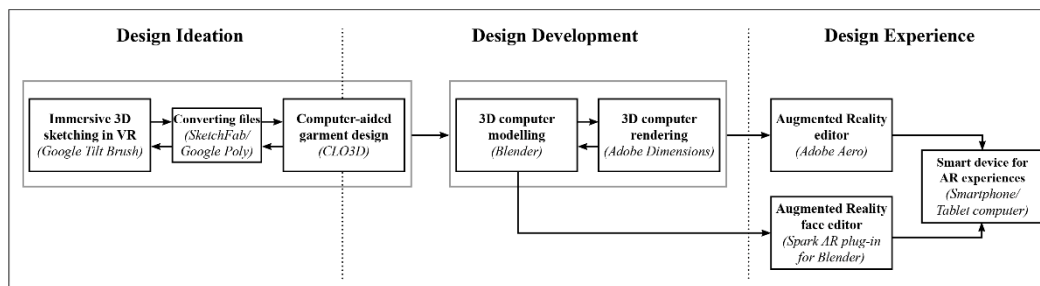
The aim of this study is to explore fundamental artistic possibilities for digital technology as a concept, method, and technique in fashion. Particular to this study, I investigated potentials of digital technologies and extended reality technologies for fashion design to suggest a design method that provides artistic freedom for designing dress with these technologies that can be experienced physically and digitally.

## 3. Methodology

The interaction possibilities between various digital and extended reality technologies were investigated to develop a method that fosters artistic design practices for digitally informed dressmaking. To critically examine the usability and relevance of this method, undergraduate fashion design students participated in a five-day workshop. The students were encouraged to experiment with different kinds of interactions between technologies such as virtual reality, augmented reality, and CAD software by applying the suggested method.

## 4. Results and Key Findings

Qualitative analysis found that the suggested methods fostered an alternative understanding and practice, among all participating students, of how digital and extended reality technology can be integrated into design practices to more creatively design dress consisting of digital and physical components. The findings further showed that the inclusion of digital and extended reality technologies in design practices could lead to alternative approaches of how dress can be designed and experienced from an artistic fashion perspective.



*Fig. 1: Shows the structure of the suggested design method and the software used for the design process.*

## 5. Originality

The evaluated findings in this study suggest that this is a viable method for fashion designers to learn how to integrate digital and extended reality technologies in their design practice for creating meaningful artistic content. The produced content displays awareness of a shift in how fashion is explored and experienced nowadays through digital media such as social media platforms and augmented reality filters.

## References

- [1] Morlock S. et. al. (2020). The transformation of Fit and Pattern with 3D towards the Future. Digital Fashion Innovation Conference (DFI), Manchester, UK.
- [2] Feng Y.F. (2020). Digital Design and Realization of Fashionable Men's Wear in Fashion Design. Journal of Physics: Conference Series 1533 022058. doi: <https://doi.org/10.1088/1742-6596/1533/2/022058>
- [3] Atkinson D. (2017). Post-industrial Fashion and the Digital Body. In Broadhurst S. & Price S. (Eds.), Digital Bodies: Creativity and Technology in the Arts and Humanities. Palgrave Studies. 147-160

# Virtual Fit of Bodices Constructed by different Contemporary Methods

M. M. Islam<sup>1\*</sup> and A. S. M. Sayem<sup>2</sup>

<sup>1</sup>Department of Textile Engineering, Northern University Bangladesh  
<sup>2</sup>Manchester Fashion Institute, Manchester Metropolitan University, UK  
(\*mazh999@gmail.com)

**Key Words:** Block Pattern, Bodice, 3D Fit, Virtual Prototype, Ease, Tension Map

## 1. Research Gap Identified

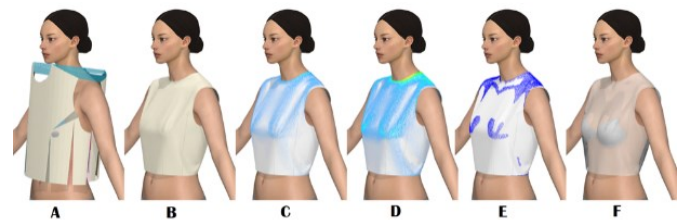
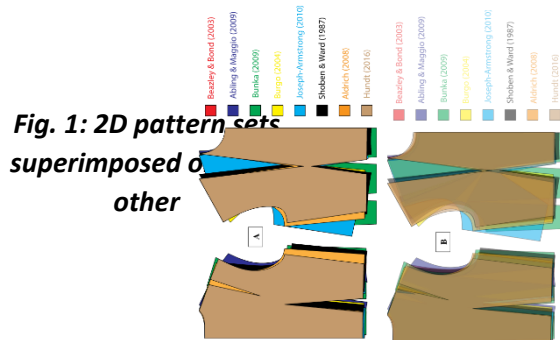
There are different pattern cutting methods available for the fashion industry. However, which one gives the best fit for a female bodice is not analysed using virtual technology before.

## 2. Aim (and Objectives)

This paper aims to analyse the virtual fit of three dimensional (3D) bodices simulated from block patterns constructed through eight pattern cutting methods commonly used in the academia and industry.

## 3. Design/Methodology/Approach

Digital pattern blocks of a bodice (fig.1) are constructed following eight selected pattern construction methods [1-8] representing a common body size and shape using a computer aided design (CAD) software. These eight sets of pattern blocks are imported into a 3D CAD system and simulated into virtual garments on a same virtual avatar (Fig.2). The drape and fit quality of the virtual bodices are analysed using the virtual drape parameters like stress map, strain map, fit map and pressure points and opaque surface view for wrinkles and compared against each other.



**Fig. 2: Different steps in virtual simulation and fit mapping**

## 4. Results and Key Findings

When the maximum stress at the bust region is considered, the bodices by Abling & Maggio (2009) exhibits the highest value of 6.9 KPa and Burgo (2004) represents the lowest stress of 0.59 KPa. At bust, the order of maximum stress in bodices by the selected methods are: Abling & Maggio (2009) > Bunka (2009) KPa > Hundt (2016) > Shoben & Ward (1987) > Aldrich (2008) > Beazley & Bond (2003) > Joseph-Armstrong (2010) > Burgo (2004) KPa. When strain values are analysed, they are found to be showing the same trend as the stress values.

## 5. Originality

Previously, there has been no comparison of virtual fit of bodice blocks constructed by different pattern cutting methods presented in academic literature.

## References

- [1] Aldrich, W. (2008), Metric Pattern Cutting for Women's Wear, 5<sup>th</sup> Edition, Wiley -Blackwell,
- [2] Abling, B. and Maggio, K. (2009), Integrating Draping, Drafting, & Drawing, Fairchild, New York.
- [3] Beazley, A and Bond T. (2003), Computer-aided pattern design & product development, Blackwell, Oxford
- [4] Bunka (2009), Fundamentals of Garments Design, 1<sup>st</sup> Edition, Bunka Fashion College, ISBN-13:978-4579112388, Bunka Publishing Bureau
- [5] Burgo, F. (2004), IL Modellismo – Tecnica del Modello Sartoriale e Industriale, Istituto di Moda Burgo, Milan, ISBN 88-900101-50,
- [6] Hundt, E. (2016), HOW TO: DRAFT A BODICE BLOCK, In the folds, Available online at <https://inthefolds.com/blog/2016/2/22/how-to-draft-a-bodice-block> (accessed on 14/03/2021)
- [7] Joseph-Armstrong, H. (2010), Patternmaking for Fashion Design, 5th Edition, Pearson Education Inc. New Hersey.
- [8] Shoben M. M. and Ward, J. P (1987), Pattern cutting and making up – The Professional Approach, Volume one, revised edition, Routledge, Oxfordshire.

# 3D Digital Fashion Design & Prototyping Towards a Sustainable Fashion Future

E. Grain\*

Department of Fashion, Leeds Arts University, Leeds, UK  
(\*emma.grain@leeds-art.ac.uk)

**Key words:** Digital Fashion, Sustainability, Avatar, 3D design, virtual prototyping

## 1. Research Gap Identified

This paper aims to explore how 3D digital design systems can facilitate some of the fashion industry's sustainability initiatives, such as those set out by the UN Alliance for Sustainable Fashion, which commits to changing the path of fashion, reducing its negative environmental and social impacts [1]. These digital tools do not intend to replace traditional techniques but to be an addition to the fashion design tool kit. The benefits include - less pre-consumer fabric waste in sampling and shorter lead times. These systems also provide an opportunity to review and forecast the clothing fit at the pre-manufacture stage and to take decision on the correctness of drafted pattern pieces [2]. With the rise of COVID-19, we are seeing more mainstream recognition of the need to engage in new design practices [3]. Brands such as the Fabricant, Balmain, Atacac and Selfridges have all utilised 3D simulation to show realistic garments for sale and demonstrate a taste of what the future of fashion could look like, both physically and sustainably.

## 2. Question (and sub question) answered

How does digital fashion design and prototyping save time and resources?

## 3. Methodology/Approach

The iterative nature of the design and prototyping study suggest a qualitative approach. The 3D design and fit process are compared to a physical industry standard fit process.

## 4. Results and Key Findings

An evaluation of the efficiencies found in the case of 3D design and fitting have been favorable over the physical in terms of time and sustainability, but not without pitfalls of skillset shortage needed to utilize such digital software as a hybrid 3D designer/tech.

## 5. Originality

Identifying the areas of efficiency in design and 3D prototyping and during this stage of the life cycle in comparison to its physical counterpart using a process alignment chart.

## 6. Research Implications and Limitations

A steep learning curve and time lag exists in establishing companies into the new way of working from physical to digital and still there is a gap between sustainable attitudes and behavior [4].

## 7. References

- [1] The UN Alliance. (2021). Home. Retrieved June 1, 2021, from The UN Alliance for Sustainable Fashion website: <https://unfashionalliance.org>
- [2] Sayem, A. S. M. (2017). Objective analysis of the drape behavior of virtual shirt, part 1: Avatar morphing and virtual stitching. *International Journal of Fashion Design, Technology and Education*, 10(2), 158-169.
- [3] Taylor Brydges, Monique Retamal & Mary Hanlon (2020) Will COVID-19 support the transition to a more sustainable fashion industry? *Sustainability: Science, Practice and Policy*, 16:1, 298-308, DOI: 10.1080/15487733.2020.1829848
- [4] Riedelsheimer, T., Dorfhuber, L. and Stark, R. (2020) 'User centered development of a Digital Twin concept with focus on sustainability in the clothing industry', *Procedia CIRP*, 90, 660-665.



# Is PLM the Existing Solution to Post Pandemic Fashion Business Digitisation?

K. Lea-Swain\* and V. Markham\*\*

Manchester Fashion Institute, Manchester Metropolitan University, Manchester, UK,  
(\*K.Lea-Swain@mmu.ac.uk; \*\*V.Markham@mmu.ac.uk)

**Key Words:** Digitisation, Collaboration, Smart Solutions, Pedagogy, Integration

## 1. Research Gap Identified

The term Product Lifecycle Management (PLM) first arose from the emerging requirement to manage the growth and complexity of product data [1]. An increase in consumerism, global sourcing strategies and volume of product choice brought about the necessity to evolve from basic Product Data Management (PDM) platforms to the capture of the complete lifecycle of a product [2]. Analysis of data has become increasingly important and PLM provides an umbrella approach to product information management and visibility. PLM is not new, and it is taught as part of the MMU Fashion Business curriculum. However, the recent pandemic has elevated the profile of this platform to a level where it is essential for students to understand it exponentially when entering the employment market. This study identifies the gap within Higher Education in adopting these digitised approaches. As well as understanding the technologies available, as future innovators students should adopt the very philosophy of this tool, increasingly working with teams across the global fashion network.

## 2. Aim

Developments in PLM platforms inform current teaching practices, enabling our students to enter industry with the basic understanding required. The focus is to analyse the benefits and efficiencies greater exposure to specific platforms provide, underpinning relevant employability skills for students.

## 3. Methodology

Secondary research is applied based on a literature review. Results are critically analysed and presented in a framework mapped to the MFI Fashion Business learning outcomes.

## 4. Results and Key Findings

Due to the shifts in consumer values, our graduates will be challenged to understand the impact that their product/supply choices have upon the environment. PLM can combine raw material choices, processing methods & supporting technologies, localisation, fair labour rates, ethical business strategies, and value chain transparency, that all combined within a PLM backbone, will go a long way to supporting true sustainability. Achieving this level of visibility is crucial if the fashion industry is to improve its reputation and provide consumer confidence when purchasing. Increasingly PLM is seen as an effective platform to help achieve this. Mintel, 2021, forecast consumer behaviour Trend Drivers as Wellbeing, Rights, Value, Identity, Experiences, Surroundings, and Technology, coupled with the acceleration of digitisation requirements during the pandemic have resulted in pressures to review current business models and embrace robust innovative smart solutions to increase efficiencies within industry. McKinsey, 2021, state productivity potential could come from action to improve efficiency through, for instance, accelerated digitization and automation. According to Lectra [3], the benefits of PLM include reduced time to market; integration with related business tools; communication tools that facilitate collaboration across global teams; cost and material consumption to drive product performance; online and offline reports to increase accuracy and efficiency

## 5. Originality

This is one of the first studies in 2021 to investigate whether PLM is the existing solution to post pandemic Fashion Business digitisation.

## References

- [1] Devra, C.S (2017). Issues and Challenges with Product Life Cycle Management (PLM) System Implementation Guidelines International Journal of Soft Computing and Engineering (IJSCE),7(3), 27
- [2] Stringer, T. et al (2020). Do ethical concerns and personal values influence the purchase intention of fast-fashion clothing? Journal of Fashion Marketing and Management.1 (1), 25
- [3] Lectra (2021) Kubix Link: Lectra's Fashion PLM & PIM Software, available online at [https://www.lectra.com/en/products/kubix-link?CID=7013V000001FrvsQAC&gclid=Cj0KCCQjw38-DBhDpARIsADJ3kjlX4NmgyUP\\_atDMS0WIVL5C9Q423cJw8XIOvbmXR4MI-MVE4\\_GbNtgaApphEALw\\_wcB#benefits](https://www.lectra.com/en/products/kubix-link?CID=7013V000001FrvsQAC&gclid=Cj0KCCQjw38-DBhDpARIsADJ3kjlX4NmgyUP_atDMS0WIVL5C9Q423cJw8XIOvbmXR4MI-MVE4_GbNtgaApphEALw_wcB#benefits)

# Understanding How Female Body Shape Impacts Garment Fit Satisfaction

C. Chrimes<sup>1\*</sup>, R. Boardman<sup>2</sup>, H. McCormick<sup>3</sup>, G. Vignali<sup>4</sup>

<sup>1,3</sup>Manchester Fashion Institute, Manchester Metropolitan University, Manchester

<sup>2,4</sup>School of Materials, The University of Manchester, Manchester

(\*c.chrimes@mmu.ac.uk)

**Key Words:** Body Scanning, Body Shape, Consumer Behaviour, Clothing Fit

## 1. Research Gap Identified

The variation between female body shapes determines how well a garment will fit and the wearer's perception of the garment [1, 2]. Although academics have found that identically sized garments can look different on different body shapes [3], research investigating how females with varying body shapes experience clothing fit is lacking. This fills this gap in the literature by understanding how females with varying body shapes experience garment fit.

## 2. Question (and Sub-question) answered

*RQ1: What are the various body shape typologies prevalent amongst UK females aged 18-34?*

*RQ2: Do females with varying body shapes experience different garment fit problems?*

## 3. Design/Methodology/Approach

30 UK females aged 18-34 were body-scanned and categorised into a body shape, using the FFIT method [4] (RQ1). This method quantitatively discerns female body shapes using proportional measurements of key body circumferences (bust, waist, hip & high hip), as opposed to visual body shape analysis which is limited to subjectivity. To gain a deeper understanding of individuals' garment fit preferences, participants verbalised their fit experiences whilst wearing the dress, through semi-structured interviews (RQ2). Interviews were analysed adhering to the stages of thematic analysis.

## 4. Results and Key Findings

The findings suggest that females with different body shapes, despite being the same clothing size, experienced various physical fit problems with the dress, delineated in Table 1.

**Table 1: Body Shape Typologies and Areas of Concern**

Body Shape	Findings	Areas of Concern
Rectangle (N=10, 33.3%)	"[...] like the bust, hips and waist fit well" (P.1221R)	Fits well at all key areas.
Bottom Hourglass (N=13, 43.3%)	"It's definitely tight across my hips and bum [...] you can see it pulling slightly at the front" (P.0122BHG)	Loose at the top of the body tighter at the hips and bum.
Spoon (N=4, 13.3%)	"around my hips it is a bit tight & my upper thigh" (P.2221SP)	Tight at hips and thigh area.
Triangle (N=1, 3.3%)	"[...] the stomach area feels a bit tight" (P.0924TRI)	Tight at the waist.
Hourglass (N=2, 6.7%)	"[...] it was a bit baggy [on the stomach]" (P.2821HG)	Loose at the waist.

## 5. Originality

The study produces a rich set of data that probes why and how different body shapes experienced various clothing fit issues contributing novel findings to the literature through a multi-method inquiry previously lacking in this area, and with a UK demographic which has not previously been explored.

## 6. Research Implications and Limitations

The research emphasises the need to incorporate digital methods, such as body scanning, into research methodologies to further understand the variation in body shape classifications. The data suggests that body shape is a crucial moderator during the garment fit appraisal process and so, the findings offer retailers insight into female's body shapes which can better inform their promotional strategies.

## References:

- [1] Pisut, G., & Connell, L.J. (2007). Fit preferences of female consumers in the USA. *Journal of Fashion Marketing and Management: An International Journal*, 11(3), 366-379.
- [2] Seo, J.I., & Namwamba, G.W. (2018). Fit issues in ready-to-wear clothing for African- American female college students based on the body shapes. *International Journal of Fashion Design, Technology & Education*, 11(2), 160-168.
- [3] Apeageyi, P. (2010). Application of 3D body scanning technology to human measurement for clothing fit. *International Journal of Digital Content and Its Applications*. 4(7), 58-68.
- [4] Lee, J.Y., Istook, C., Nam, Y., & Park, S.M. (2007). Comparison of body shape between USA and Korean Women. *International Journal of Clothing Science and Technology*, 19(5), 374-391.

# Perception of garment fit in different colour lightness and body shape conditions

F. Baytar<sup>1\*</sup>, E. Buyukaslan<sup>2</sup> and M. Maher<sup>1</sup>

<sup>1</sup>Department of Fiber Science and Apparel Design, Cornell University, Ithaca, NY, USA; <sup>2</sup>Fashion and Textile Design Department, Istanbul Bilgi University, Istanbul, Turkey (\*baytar@cornell.edu)

**Key Words:** fit perception, colour lightness, body shapes, body scans

## 1. Research Gap Identified

Garment fit, style, and colour are the most prominent product attributes that provide assessment cues for apparel shoppers. Women tend to associate colour lightness with slim /fat look [1]. Moreover, body shapes influence body satisfaction and eventually impact on consumers' fit preferences [2]. Existing studies usually focus on examining how individuals prefer their garments to fit on their own bodies. However, particularly for online shopping, most of the consumers view garments on bodies that are different than theirs and there is a likelihood that their fit perceptions are impacted by colour lightness.

## 2. Hypotheses

In the present study we examined the following hypotheses to address the identified research gap:

*Hypothesis 1:* There will be a significant difference among the mean fit evaluations observed for different body types, and, *Hypothesis 2:* There will be a significant difference among the mean fit evaluations observed for different colour conditions.

## 3. Methods

A drop-waist dress design that presented some fit issues was used to prepare the virtual dress conditions in CLO3D. We used the CAESAR body scan database to identify three different body shapes [3] and create three fit conditions: (1) perfect fit on an hourglass body, (2) misfit condition A on a triangle body shape, and (3) misfit condition B on an oval shape. Four colour conditions, i.e., dark solid, light solid, 50 dark/ 50 light tossed print, and transparent, were generated. Qualtrics was used to survey female participants upon receiving an IRB approval. Participants rated five areas to evaluate dress fit on a 7-point Likert-type scale, and answered questions on demographics. Data analyses such as descriptive statistics and one-way ANOVA were conducted by using SPSS 25.

## 4. Results and Key Findings

A total of 480 women participated in the study. Of the 480 participants, 47% were Caucasian, 41% were Asian, 6% were American Indian or Alaska Native, 5% were Black or African American. Participants' ages ranged from 18 to 69. There was a significant difference among the fit evaluations measured for different body shapes regardless of dress colour ( $p < 0.05$ ,  $F = 3.03$ ). Therefore, Hypothesis 1 was accepted. In particular, fit evaluations of the transparent dress on hourglass, oval, and triangle body shapes were found to be significantly different at shoulder, waist/abdomen and overall ( $p < 0.05$ ), but not at the hip ( $p = 0.08$ ) and bust ( $p = 0.13$ ). There was no significant difference among the fit ratings measured for different dress colours regardless of the body shapes ( $p = 0.30$ ), for this reason Hypothesis 2 was rejected.

## 5. Originality

This study provided valuable findings since the relationships among garment colour, body shape, and fit perceptions are often neglected in the apparel literature, and we have used digital stimuli for study conditions.

## 6. Research Implications and Limitations

Body shape was found to be a significant variable for evaluating garment fit, whereas colour lightness did not have a significant impact on fit evaluations. Future studies should examine the potential impact of other colour dimensions (i.e., hue and saturation) as well as additional body shapes on garment fit evaluation.

## References

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- [2] Manuel, M. B., Connell, L. J., & Presley, A. B. (2010). Body shape and fit preference in body cathexis and clothing benefits sought for professional African-American women. *International Journal of Fashion Design, Technology and Education*, 3(1), 25–32. <https://doi.org/10.1080/17543261003627813>
- [3] Simmons, K., Istook, C. L., & Devarajan, P. (2004). Female Figure Identification Technique (FFIT) for apparel part I: Describing female shapes. *Journal of Textile and Apparel, Technology and Management*, 4(1), 1–7.

## Dress Block: The challenges of blockchain adoption for the circular economy

H. Heim<sup>1\*</sup> and C. Hopper<sup>2</sup>,

<sup>1</sup>*School of Design, Queensland University of Technology, Brisbane, Australia;* <sup>2</sup>*Centre for a Waste Free World, Queensland University of Technology, Brisbane, Australia;* ([\\*hilde.heim@qut.edu.au](mailto:hilde.heim@qut.edu.au))

**Key Words:** Blockchain, small and medium enterprise (SME), circular economy, fashion supply chain, digital transformation.

### 1. Research Gap Identified

Garments tracked and traced via blockchain enabled applications can facilitate circular textile flows – thus avoiding premature or unnecessary disposal into landfill [1]. Well resourced, large scale fashion firms are now deploying blockchain technology, effectively managing its research, development and implementation. However, subject to a number of factors, small to medium fashion enterprises (SMFEs) are unable to access the technology.

### 2. Aim and Objectives

Given the interest and hype surrounding blockchain, this study firstly investigates the advantages of technology that facilitates the correct flow of materials through the circular supply chain, including current use cases in large scale firms. Second, the study asks why blockchain initiatives have not been readily adopted by small scale fashion firms and how the barriers to entry may be addressed.

### 3. Methodology

The investigation applies the interpretive lens of fashion studies which views technology adoption from the standpoint of the small to medium fashion entrepreneur. Open-ended interviews were conducted with small to medium fashion entrepreneurs and technology solutions providers. This study differs from other theoretical perspectives on blockchain - such as corporate management studies, information systems, economic, geographic or behavioural economics - as these studies address the current context and state of the technology to inform corporate executives, economic decision makers or software engineering cohorts [2]. Also, few studies address the sustainability potential of the technology, not to mention the circularity and end of life scenarios.

### 4. Results and Key Findings

Despite revealing a latent appetite for digital transformation and willingness by small to medium fashion enterprises to adopt if affordable, only one of the SMFEs interviewed have implemented blockchain to track and trace fibres. Furthermore, evidence that blockchain can facilitate the circular economy in the fashion industry was not indubitably produced in this study. This is not surprising as there is currently neither an affordable nor universal open access platform available, nor is there understanding on the part of the SMFEs on what to do if connected.

### 5. Originality

This investigation demystifies the hype regarding blockchain's potential to facilitate the circular economy. It adds to the literature by identifying a number of barriers to adoption – each of which also represent opportunities that may be investigated in the future as the technology continues to develop.

### 6. Research Implications and Limitations

This study's implication for theory suggests new parameters for trans-disciplinary communication are emerging around digital transformation and technology adoption driven by the rapid emergence of multiple, complex and interconnecting technologies. First, a common data ontology is required between fashion producers if blockchain is to be universally adopted. Second, as the diverse systems of fashion and technology do not easily understand each other's organisational requirements, communication is required across disciplines, including greater digital literacy, knowledge and understanding of the capabilities and utility of the technology. This will enable the SMFE to decide whether or not to adopt if affordable open access becomes available.

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## Digital personal shopping – Exploring innovative customer experiences

C. Evans<sup>1\*</sup>, C. Beaty<sup>2</sup>, C. Goldthorpe<sup>1</sup>, Z. Kang<sup>3</sup>

<sup>1</sup>*Fashion and Textile Department, University of Huddersfield, Huddersfield, UK,*

<sup>2</sup>*Independent researcher, Amble, Northumberland, UK*

<sup>3</sup>*Fashion and Textile Department, University of Leeds, Leeds, UK*

(\*c.k.evans@hud.ac.uk)

**Key words:** Digital fashion design, virtual garment simulation, personal shoppers

### 1. Research gap Identified

This report explores opportunities to develop digital personal shopping experiences for an independent UK fashion manufacturer. Design-led fashion brands need to explore the possibilities of developing innovative digital marketing techniques that support independent UK manufacturers competing in ever more demanding retail environments. The decline of high street clothing retail is well documented, although there has also been an increase in online clothing sales [1]. Independent UK brands who design, manufacture and retail high quality fashion face numerous challenges to achieve successful and sustainable growth. The key to this is to innovatively use the vast array of web based digital technologies now available to effectively drive increased sales and improve the customer shopping experience.

### 2. Aim and Objectives

The UK's fashion and textile industry are on a journey to introduce the digital world to their production processes and "virtual garment simulation is the result of a large combination of techniques that have dramatically evolved during the last decade"[2]. The digital personal shopping experience involves a style consultation and the creation of virtual garments on an avatar matching the client's measurements." [2] It is through intelligent use of technology that a user can experience engagement with a brand online that normally would be delivered in person. By offering potential consumers a style consultation they are given the opportunity to receive specialist style advice and to build a rapport with the brand. The benefits are quite simple "the more personal attention you give a certain kind of customer — and the more products you put in front of them — the more they will spend." [3]

### 3. Approach

The digital personal shopper offers an online opportunity to visualise not only how garments would look when worn but also how the garments fit on different shaped figures. This study explored how pre-established designs could be simulated as 3D garments on avatars using CLO 3D, Optitex and DC Suite to offer high quality, 3D personal shopping experiences for customers and comparison of technology for designer brands. The concept of providing a personal shopping experience using virtual fitting rooms was developed and the idea was trialled by digitising two pre-existing garments from fashion brand Nomad Ateliers range

### 4. Result and Key findings

After conducting an in-depth trial of the digital personal shopping concept, it was discovered that it was an attainable model and digital garments were successfully created using a combination of CLO 3D, Optitex and DC Suite. Further research around fit, including figure measuring and garment tolerances assessment is now required. The research highlighted the need for suitable investment and training to implement the digital personal shopper service. Overall, it was shown that there was a successful way to use technology to implement a digital personal shopping experience effectively.

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## Brand v Consumer: Who has the power in fashion crisis management?

S. Johnson

*Birmingham City University, United Kingdom*

**Key Words:** Fashion, Crisis, Value Co-Creation, Online Community, Engagement

This project explores how public relations (PR) in the fashion industry can depend on consumer relationships to co-create value in times of crisis. It addresses a lack of research into fashion retailers and crisis management, but also how PR plays a part in converging these. (Gistri, Corciolani and Pace, 2018). Due to the uncertain future of fashion there is a gap of research analyzing the co-production of value in the relationship between fashion retailers and consumers in times of crisis (Gistri, Corciolani and Pace, 2018).

Fashion retailers must become increasingly competitive and guided by digital acceleration in order to increase and maintain market shares post-pandemic (Silva and Bonetti, 2021). Vulnerability to crisis for fashion retailers is higher than ever before, with increased consumer pressure and the watchful eye of social media. Moritz and Youn (2020) suggest that through crisis management, online communities can be used to a brand's advantage in times of vulnerability. These online communities of consumers can have benefits to retailers as they are recognised as value co-creators (Nyadzayo et al, 2020). Through online platforms, consumers are able to create communities prolonging engagement with brands (Yang et al, 2016), facilitate interactions around shared values and content (Richter and Kick, 2007) and support or enable brands to cope with crisis (Yuan et al, 2020) Social media allows for negative word of mouth but can also be a useful brand tool to mediate the impact of crisis through consumers (Mishra & Sharma, 2019).

This study utilises a comparative analysis using a process of discourse analysis to determine the impact of crisis on the online communities of two fashion retailers. Allowing a comparison of social media responses from the identified consumer groups to examine reactions during the brand crisis. The analysis will take into account owned media surrounding the brand crisis and consumer response at the time of crisis on specific posts. The focus of this study will be on the 2020 BooHoo.com sustainability crisis and the Arcadia collapse in November 2020. The two retailers both have different pre crisis reputation and also have differing levels of engagement from their online communities. Although both receive negative commentary, some comments are found defending the retailers, demonstrating how communities can deliver value in crisis. This research informs fashion retailers within the UK how to effectively measure their consumer relationships and translate value in moments of crisis. Due to the undeveloped area of fashion, PR and crisis management, the project can also make a scholarly contribution.

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# A study of Prevailing 3D Body scanning Mobile applications: A contact-free Body measuring solution for mass-customisation approach in fashion e-commerce environment

S. Idrees\*, S. Gill, G. Vignali

Department of Materials, University of Manchester, Manchester, UK

(\*sadia.idrees@manchester.ac.uk)

**Key Words:** 3D Body Scanning, Mobile Scanning, Mass customisation, Virtual size and fit, Fashion e-commerce, digital measurements.

## 1. Research Gap Identified

The body types and sizes variation among individuals have turn out highly pronounced in cases where standard size clothing fails to provide what the consumers look for (McKinney, Gill, Dorie, & Roth, 2017). Therefore, it is essential to develop a system that has the potential to make certain that all body types are served equally, and the size choices are broadened (Jain et al., 2018).

## 2. Aim (and Objectives)

The aim of the study is to review comparative features, benefits, proposed solutions and mechanism of 3D body scanning mobile applications for enhancing mass-customisation to satisfy consumers by delivering the right size and fitted garment during online shopping.

## 3. Design/Methodology/Approach

A Qualitative research study has been conducted to determine the key 3D body scanning mobile applications. Various search methods have been approached for data collection. Initially, the applications were identified by snowball sampling, with keywords search such as 3D body scanning mobile applications on google, google scholar, and academic journals. Secondly, the applications are selected after fulfilling the criteria of offering user-friendly 3D body scanning, extraction of digital body measurements, Avatar creation for customisation of a garment, size and fit recommendation, and fit visualisation of various sizes. Lastly, the details of applications were determined through installing and testing each application and by app information explained on companies' websites.

## 4. Results and Key Findings

3D body scanning mobile applications have been developed extensively to engage with online shopping, clothing size, and fit selection and to enhance the clothing production method to offer mass customisation. 3D body scanning delivers a rapid and greater depth of digital body dimensions data by identifying body landmarks within 2 min to improve product development (Bye et.al, 2006; Gill, 2015). The technology offers consumers a contactless user-friendly method to obtain digital measurements themselves at home and receives size and fit recommendations specific to their measurements and body shape data, and fit visualisation on personalise avatars. The 3D body scanning mobile applications under study are MeThreeSixty, 3Dlook, and Mirrorsize.

## 5. Originality

This study makes a cross-comparison review of the applications and allows for identification of the strengths and limitations with a focus on how the technology facilitates bespoke product development by satisfying consumers in terms of size and fit as standard sizing system leads to unsatisfied consumers.

## 6. Research Implications and Limitations

The research is limited to three different 3D body scanning mobile applications. All of them have distinct features and belong to different geographical locations.

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# The influence of technology-enhanced store atmospherics on customer engagement in luxury fashion retail: a conceptual framework

Ni Zeng<sup>1</sup>

<sup>1</sup>*School of Materials, University of Manchester, Manchester, United Kingdom, (ni.zeng@postgrad.manchester.ac.uk)*

**Keywords:** Store atmospherics, customer engagement, interactive technology, luxury retail

## 1. Research Gap Identified

Industry and academia have both realised the importance of using interactive technology for enhancing customer engagement and providing excellent customer experiences (Lemon and Verhoef, 2016; Grewal, 2017; Hollebeek et al., 2019). A body of literature exists on the effect of store atmosphere on consumer behaviour. However, few studies consider the role of technology on multiple atmosphere factors, and how technology-enhance atmosphere affects the emotional responses, and the customer perceived values, within luxury store settings (Roggeveen et al., 2019). There has a gap in understanding the impacts of in-store technology-enhanced atmosphere on customer engagement and experience, taking into account potential moderating effects of the virtual presence of other customers (Pantano and Verteramo, 2017).

## 2. Research aim

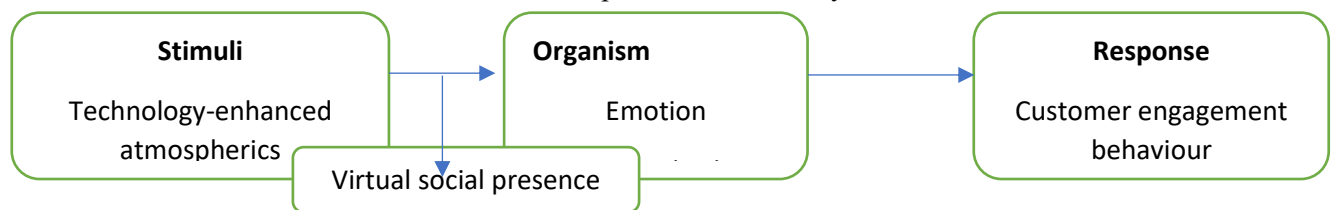
This research aims to investigate the influence of store atmosphere on customer engagement within the in-store luxury retail context, by further examining the role of interactive technology on engagement and experience, as well taking into account any moderating effects related to Virtual presence of other customers.

## 3. Methodology

This research will employ quantitative method and online questionnaires to collect data from 300 Chinese millennials. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) is used to explore the possible underlying relationship among set of observed variables. Then, structural equation modelling (SEM) and regressions will be used to test all hypotheses. T-test and ANOVA will be used to examine the distinction among different group of samples.

## 4. Results and Key Findings

Based on the prior studies, this paper presents a theoretical framework to outline hypotheses, which have been created based on the extant literature. However, the data collection part has not started yet.



*Fig.1 The conceptual framework of this paper*

## 5. Originality

The originality in this paper resides in the development of newly developed hypotheses to test the technology-enhanced atmosphere affects in-store customer engagement and experience, whilst interpreting the potential moderating role of customers within the in-store context. This paper also reveals the negative emotional responses that clarify how negative emotions affect customer engagement behaviours.

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# The Door to the Digital World

A. Mitchell

*Manchester Fashion Institute, Manchester Metropolitan University, Manchester, UK*  
*([a.mitchell@mmu.ac.uk](mailto:a.mitchell@mmu.ac.uk))*

**Key words:** 3D Body Scanning, Digital Measurement Systems, Virtual Scanners, Virtual Try-on, Mass Customisation

## 1. Research Gap Identified

3D body scanners and digital measurement systems have been used in varying degrees by the Fashion Industry for decades because accurate body measurement data is a key requirement for good design and fit. Manual measuring methods that use traditional tape measures are generally time consuming, invasive and can compress the surface of the skin often producing inaccurate and variable results. The relevance of 3D body scanning and digital measurement systems in achieving accurate fit has recently witnessed a full-scale renaissance as a direct result of the COVID 19 pandemic which has further emphasised the fact that many retailers continue to sell clothing that does not fit, and that this approach does not support sustainable strategies or meet customer expectations. The importance of 3D body scanners and digital measuring systems in achieving accurately fitting apparel within an increasingly digitalised industry, mean they are now regarded by many as 'The Door to the Virtual World' (Cathcart, 2020)

## 2. Aim (and Objectives)

This research outlines the variety of new and emerging technologies in the area of 3D Body Scanning and Digital Measurement Systems and demonstrate both their potential to support the digital transformation of the Fashion Industry as well as their value in redressing key sustainability issues relating to fashion design, development, manufacture and ecommerce. Examples of new and emerging technologies include new development in mobile scanning technology, such as 'Methreesixty', in supporting the drive towards personalisation of apparel, and their application in enhancing sustainable design and retail buying practices whilst safeguarding data privacy. Other examples include the introduction of Body Volume Index which supersedes Body Mass Index in relation to supporting the accurate mapping of shape and size, as well as developments in data acceleration modelling to support predictive marketing in response to changing demographics. The application of new associated technologies such as LIDAR for the purposes of scanning the body is also considered in this research, particularly how this space age technology can assist to enhance and transform body scanning,

## 3. Methodology/Approach

This qualitative research has been informed by the Oral Histories methodology. Oral Histories methodology often focus on uncovering information predominantly from the past, but it can also be used '*as a means to open up multiple perspectives*' (Sage, 2014). This research will involve detailed and anonymised recorded interviews with high profile Fashion Industry professionals involved in the creation and innovation of digital solutions within the specialist area of 3D body scanning and digital measuring systems for the fashion industry.

## 4. Results and Key Findings

- Mobile scanning technology has superseded the gold standard booth scanner
- Body Volume Index is a more precise method of mapping shape and size in comparison to Body Mass index
- Significant changes in migration means new data on size and fit is needed.
- Data Acceleration Modelling (DAM) is essential when carrying out national size surveys as this can support retailers to identify fluctuating changes in size and fit of their consumer over time
- Cubicle scanning technology and mobile scanners are driving the custom-fit market
- The custom fit market is supporting sustainable manufacturing by directly driving micro manufacturing
- Virtual body scanners support sustainable retail practice by improving sell through whilst reducing costs and waste associated with online returns
- Rapid technological developments in virtual body scanning involving 'no-photo upload' may assist to assure data privacy of end user and support the childrenswear market in the future
- LIDAR scanning technology will greatly assist to revolutionise virtual try-on for fashion e-commerce businesses, helping to reduce returns and waste associated with this.

## 5. Originality

This research is considered original for two reasons. Firstly, the researcher has gained unique access to the leading world authorities in 3D body scanning and 3D Measurement systems and secondly this research has been undertaken within the last twelve months meaning its outcomes are incredibly current and up-to-date and are original and have not yet been published.

## How can fashion industry use XR technology to the customer's added value experience

M.N. Chatziathanasiou and E. Papachristou\*

*Creative Design & Clothing, International Hellenic University, Thessaloniki, Greece;*  
(\*evridikipapa@ihu.gr)

**Key Words:** XR technology, Customer experience, Customer value, B2C

Extended reality (XR) is an umbrella term that encompasses augmented reality (AR), virtual reality (VR) and mixed reality (MR). This technology in fashion has transformed the way brands engaged with their customers, while offering them new experiences within the physical and the virtual environments. Findings suggest that the implementation of XR provides a more intuitive, environment-related interface consistent with the way consumers process information, providing a more effective and pleasant online shopping experience, while following them in their customer journey by providing contextual information and virtualization to consumers in the pre-purchase stage. Moreover, XR enhances user experience during the purchase stage, and improves post-purchase services [1-6].

### 1. Research Gap Identified

During this research it has been noticed that there is a lack of scientific articles and sources specialising in the B2C (Business-to-Customer) relations with the use of XR technology.

### 2. Aim (and Objectives)

The objective is to explore how this immersive technology is implemented by the fashion industry, how those new experiences can offer value to customers and what this value might be.

### 3. Methodology

This research is part of an undergraduate academic research on XR applications and their role in the fashion industry, with the objective to explore how those immersive technologies can be used for practices such as design, manufacturing, marketing and retail, but also how they can add value to the customer of a company that successfully integrates them. Authors relied on secondary research to investigate previous theoretical studies along with industry's use-cases.

### 4. Results and Key Findings

With the increasing ubiquity of smartphones and tablets, XR applications within the fashion industry are increasingly being embraced as a tool for creating immersive customer experiences. When this technology is used for marketing purposes, it targets Gen Z and young millennials who were grown up blurring reality and fantasy, with the virtual world becoming their second "home".

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# Comparing the effects of 'showing available product' and 'showing unavailable product' by social media influencer for luxury fashion brands

Liru Jiang\*, Ni Zeng, Enshang Shang

School of Materials, University of Manchester, Manchester, United Kingdom,  
(\*liru.jiang@manchester.ac.uk)

**Key Words:** Social media marketing, influencer marketing, luxury fashion brands

## 1. Research Gap Identified

New social media activities are changing influencer marketing nowadays (Wu, 2020<sup>[1]</sup>). The head of buying of Voo Store started asking social media influencer to post past-season product, which is for connecting with consumers rather than pushing product (Chitrakorn, 2021<sup>[2]</sup>). This activity is worth studying based on luxury fashion brands in China, because influencer marketing should be explored further for luxury fashion brands (Eisend & Langner, 2010<sup>[3]</sup>), and influencer marketing through social media shows different features in China (Yu and Hu, 2020<sup>[4]</sup>). The objectives of influencer marketing for involving target audience include awareness and consideration (Levin, 2020<sup>[5]</sup>), this study will fill the academic gap of social media influencer marketing for luxury fashion brands by the new social media activity.

## 2. Research aim

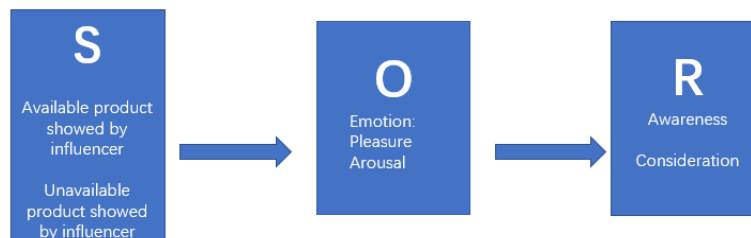
The research aim is comparing the effects of 'showing available product by influencers' and 'showing unavailable product by influencers' through social media in achieving awareness and consideration for luxury fashion brands.

## 3. Methodology

A quantitative approach and online questionnaires are used to collect data from around 300 Chinese (Generation Z). Independent sample T-test will be used to compare the variance of the two forms of influencer marketing (independent variables), the achievements of different influencer marketing objectives are the dependent variables.

## 4. Results and Key Findings

The research results are based on the S-O-R (Fig.1). A comparison is made about the effects of 'showing available product' and 'showing the unavailable product' by the social media influencer for luxury fashion brands.



**Fig. 1: Application of S-O-R model for the current study**

## 5. Originality

This manuscript does not contain the same information as manuscripts under review, accepted or published.

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