IFFTI 2017 AMSTERDAM

BREAKING THE FASHION RULES

Photo: Despoina Markopoulou

CONFERENCE PROCEEDINGS

IFFTI Conference 2017: Breaking The Fashion Rules

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PREFACE

IFFTI was founded in 1999 with a mission to develop a global network of institutions to advance education in Design, Technology and Business for fashion and its related industries through international collaboration. The purpose of IFFTI's Annual Conferences is to promote debate, interaction, and professional development for students, educators and researchers *(*www.iffti.com*)*.

AMFI – IFFTI - Breaking the Fashion Rules was a three-day event *(March 28th, 29th & 30th 2017)* where interaction took place between keynote speakers – education – research and the fashion industry.

'Old' paradigms and strategies within the fashion industry are still dominant; more, cheaper, bigger, faster and a constant focus on growth and return on investment.

Education can provide a catalyst for change, by interrogating the status quo. We can design the change, create the opportunities, and build a generation of fashion professionals who know how to break the rules and to develop new perspectives.

My sincere thanks to the sponsors for providing us support and funds for holding this conference.

My special thanks to Souraya Bouwmans-Sarraf Chair of 2017 IFFTI conference, for her sincere efforts, hard work and commitment for this conference. After six years as the Director of AMFI she was able to complete her tenure with this testament of her drive and passion for IFFTI.

With warm regards,

Irene Sparreboom

DIRECTOR OF **AMSTERDAM FASHION INSTITUTE**

INTRODUCTION

It is an honour and privilege to present to you the proceedings of the 19th edition of the International Foundation of Fashion Technology Institutes (IFFTI) conference, held in Amsterdam, the Netherlands on the 28th, 29th and 30th of March 2017.

It was a great pleasure to meet so many of our international colleagues, researchers, students and fashion industry professionals and welcome them to our capital to discuss the theme 'Breaking the Rules'

AMFI is currently the largest fashion institute in the Netherlands. However, what makes AMFI truly unique is that it is also the only fashion institute in the Netherlands that covers the entire fashion chain. This not only ensures our students have a broad perspective of the fashion industry, but also allows us to both detect and address the ever changing spirit of fashion from a holistic perspective.

In recent years the need for a paradigm shift clearly came to the fore. In a rapidly changing global economy and with accelerated advances in technology there are tensions and dichotomies at the heart of the fashion industry. The development of mobile commerce has created a shifting dynamic which has altered the ways in which people consume and engage with fashion. This all enables lower costs and greater flexibility in design, quality, production and speed to the consumer. However, the traditional strategies within the fashion industry are still dominant; more, cheaper, bigger, faster with a constant focus on growth and return on investment.

Today, the fashion industry is faced with many challenges. Our aim, with the IFFTI conference was to interrogate some vital but basic questions; What does fashion signify and contribute to a healthier, better and a prosperous world for everyone? What are the big challenges the fashion industry is facing? Which rules do we have to break to find new answers for these challenges? And in what ways can fashion education initiate and lead this process?

We at AMFI believe that education can provide a catalyst for change, by questioning the status quo. We can create new opportunities by designing the change, creating the opportunities, and building a generation of fashion professionals who know how to break the rules and how to develop new perspectives.

During keynote lectures at the Rijksmuseum and the Hermitage we hope we inspired you with a combination of innovative contemporary fashion initiatives as well as our rich heritage. I would like to take this opportunity to especially thank our sponsor Heineken, who made it possible for us to enjoy these great locations.

During the conference, over 25 academic papers were presented. These papers initiated discussions between the delegates on why and how the fashion rules should and could be broken.

I would like to thank each of the contributors for sharing your papers so that those who were not able to attend the conference or the presentations can still benefit from your knowledge.

Organising this conference was an incredibly rewarding journey and I wish to thank the IFFTI Executive Board for their support and trust in our abilities as hosts and editors of the Conference Proceedings. I would also like to give special thanks to Souraya Bouwmans-Sarraf Chair of 2017 IFFTI conference, for her sincere efforts, hard work and commitment for this conference. After six years as the Director of AMFI she was able to complete her tenure with this testament of her drive and passion for IFFTI.

I hope you will enjoy reading each of these papers and that they will inspire a dialogue with colleagues, student, and fashion practitioners to break the fashion rules.

———

Irene Sparreboom

DIRECTOR OF **AMSTERDAM FASHION INSTITUTE**

CONFERENCE THEME

IFFTI Conference 2017: Breaking The Fashion Rules

In today's rapidly changing global economy, and with accelerating advances in technology, there are tensions and dichotomies at the heart of the fashion industry. The development of mobile commerce has created a shifting dynamic which has altered the ways in which people consume and engage with fashion. This has enabled lower costs and greater flexibility in design, quality, production and speed to consumer. But the 'old' paradigms and strategies within the fashion industry still dominate; more, cheaper, bigger, faster – and a constant focus on growth and return on investment. Large-scale incidents and controversies are presenting the fashion industry with all kind of issues.

Increasingly, these boil down to the basic questions:

- What does fashion signify?
- And how does fashion contribute to a healthier, better, and more prosperous world for everyone?

At the same time, these changes are creating new opportunities for a young generation to question the status quo and to challenge the fashion industry to find new solutions that are special, exclusive, and innovative.

In conversations and countless articles we hear how the fashion industry needs to adapt to this state of constant flux, and that not everyone wants to embrace this call for change, being unable or unwilling to abandon the old rules.

Education can provide a catalyst for change by interrogating the status quo. We can design the change, create the opportunities, and build a generation of fashion professionals who know how to break the rules and to develop new perspectives on challenging issues.

- What are the serious challenges the fashion industry is facing today?
- Which fashion rules will we have to break in order to find new answers for these challenges?
- And how can fashion education initiate and lead this process?

The 2017 IFFTI Annual Conference in Amsterdam has therefore adopted 'Breaking the rules' as its central theme.

1. FASHION ACTIVISM
(Different perspectives and paradigms on fashion)

- Historical
- Cultural
- Aesthetic
- Consumer

2. FASHION BUSINESS MODELS
(Corruptive systems of fashion)

- Business models
- Production models
- Fashion systems

3. FASHION DISRUPTIVE TECHNOLOGY
(Different approaches to the fashion product)

- Digital and online technology
- Biotechnology
- Textile technology

AMFI

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AMFI's education covers all facets of fashion from developing a raw idea to a product and an image. Students are taught to understand the entire fashion chain and their specific discipline in a wider perspective. With a reality school concept we are combining creativity, research, craftsmanship and technology to prepare our students for the future.

AMFI is the largest fashion institute in the Netherlands. More than 100 lecturers teach more than 1100 students about all aspects of the fashion world. AMFI is also the only fashion institute in the Netherlands that covers the entire fashion chain. This ensures our students to have a broad perspective of the fashion industry.

They choose to specialise in either Fashion & Design, Fashion & Management or Fashion & Branding. AMFI offers all its programmes in Dutch as well as in English. Students graduate with a Bachelor's Degree in Fashion & Textile Technologies.

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The International Foundation of Fashion Technology Institutes(IFFTI) is an international association of leading higher education institutions dedicated to promoting excellence in teaching and learning in fashion and fashion related programs.

IFFTI is the most comprehensive and prestigious international organisation representing leading fashion higher education institutions in areas of design, technology and business. The foundation comprises of members from over 19 countries world-wide.

IFFTI Member Institutions participate in International annual conferences and collaborate with each other in bilateral agreements and many professional development activities. IFFTI has set the standard for fashion education throughout the world and IFFTI Members foster close relationships with fashion related industries.

IFFTI 2017
AMSTERDAM

Fashion Activism

Photo: Amy Kleingeld

CONFERENCE PROCEEDINGS

SUBTOPIC

FASHION ACTIVISM

Different perspectives and paradigms on fashion

Papers & Abstracts

The Rule That Needs To Be Broken: Smart Fashion Is for Gadget Junks or Special Needs

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KEYWORDS

Smart fashion, framing, mass media, consumer, fashion discourse

ABSTRACT

Numerous market studies predict each year significant growth of the wearable technology market and a massive increase of global spending on wearable devices. Simultaneously, market analytics are talking about "the uncertainty of consumer receptivity". Till now the popularity of wearables is limited to a number of gadgets as smart watches and fitness bands, health and self-care wearable devices. Mass production of smart fashion items is still out of question. Whether this "rule" will be broken any soon, depends on a lot of technological and social factors. One of these is mass media. Researchers emphasise the crucial role of the mass media in the fashion discourse, where the media has been seen as *"an important basis of the ideology of consumption"*.

The objective of the presented research is to show how smart fashion has been presented in the modern journalists texts published in English. The principles of the critical discourse analysis and framing theory were applied to the coding system of our content analysis of 448 relevant texts retrieved from LexisNexis database. The biggest amount of the analysed journalistic texts are reporting about the relies of the new smart product; the articles about the future potentials of the wearables and the reviews of the latest e-textiles market research are also among the most popular subjects of the media. A consumer self attracts very little attention from the media, when they publish about smart fashion. Texts about the topic can be described as a multi-discursive, where the technological discourse has been explored most intensive, followed by the fashion discourse. Against our expectations, the economical context has been also rich presented in the items about e-mode. The medical & healthcare and sport & fitness have been illuminated as the most common fields of use of the innovative clothing and gadgets. In the articles we can hear the voices of designers, experts, scientists and industrials; only consumer has been hardly presented in the texts. Remarkable, when consumers speak, they find wearables "too invasive", "mind blowing", "a media-hype"; the public wants to know "how technology will change our life" and is worrying about privacy and safety of personal data. Right now the mass media frames smart fashion as a niche market for minorities. The conclusion is, without a systematic and properly framed coverage of the subject in the mass media; it will be very difficult for the hi-tech fashion to find its way to the mass consumer.

Introduction

"Smart fashion" sounds fashionable! But are you ready to buy it? To begin with, the term itself has a very broad range of interpretations (from the umbrella expression for all kind of technological wearables to the exclusive fashion collections for *smart women*). There are two major usages of the concept *smart* when it

comes to clothes and fashion. First, there is a traditional interpretation of the *smart clothes* – "neat, conventional, yet relatively informal in style, especially as worn to conform to a particular dress code" (Oxford Dictionary). In this sense the term has often been used in the "style solutions" articles in mass media (see, for example, the publication "8 Workwear Brands to Have on Your Radar" by Olivia Lindbury in the Telegraph (Lindbury, 2015)). The second, relatively new, meaning of the term emphasises the technological and user beneficial characteristics of the wearable item. This is how, for instance, the AiQ Smart Clothing Inc. put it: "Electronics merge with textiles to create fashionable, comfortable, functional solutions to meet your everyday needs; whether it's in sports & fitness, outdoor & leisure, home & leisure, home care & health care" (http://www.aiqsmartclothing.com/).

Within this modern concept of smart fashion a lot of different types of wearables can be named. There are accessories, e-textile & garments, clothes & shoes, etc. For the experts in smart textile the concept of smart clothing "consists of a textile structure that senses and reacts to different stimuli from its environment" (Berglin, 2013: 3). For the researchers of the semantics of smart clothes this term "describes garments that future a function (in- and output) in combination with an intelligent material" (Steffen, Adler and Weber Martin, 2009; 80). Based on the analysis of ca. 40 products (items already established on the market or market-ready and also experimental pieces), Steffen, Adler and Weber Martin (81—82) presented quadrant-model of smart clothes; this classification consists of four types of garments, which –

"Characterize neither an appealing design nor additional benefit";

"Exhibit a verifiable surplus but are in terms of design likewise average";

"Are explicitly designed with focus on expression and special effects";

"Offer simultaneously a challenging design and utility value".

However, due to the different grounds and perspectives of research there is no universal classification in the field of wearables yet; we assume that such a task by itself will be rather challenging for the researcher as long as it will be just a description of the rapidly changing and growing phenomenon.

In our paper we will use the term *smart fashion* in the most common way as *a collective name of any apparel, which has any additional function, created by innovative technology*. We will leave aside the discussion of whether it is fair to attribute these smart items as fashion at all.

"Big expectations"

Numerous market studies predict each year significant growth of wearable technology market and massive increase of global spending on wearable devices (up to $218 billion in 2019). According to the overview report about smart textiles in fashion, around 70 million euros were spent by 2013 to finance EU-projects in this area (Berglin, 2013: 24). Scholars call fellows to combine efforts in "innovative interdisciplinary research in fashion by moving beyond traditional boundaries" and "to apply all the research in the multidisciplinary sector into fashion needs a transforming methodology to make the innovation socially significant and meaningful" (Hegde, 2015: 1).

"We're seeing sensors become commonplace," DuBravac, chief economist of the Consumer Technology Assn, said. "The cost structure of sensors is going down ... so it's cheaper to build it into a wide number of things" (Chang, 2016: 3). There are also big expectations from nanotechnology, which is going to be applied in textiles. The spectrum of possible implementations is very broad (Hegde, 2015: 3): colour changing fabrics, shape memory textiles, sweat-free garments, life-signs monitoring, power generation and storage to enable communication with the outside world, strength and shock absorbent fabrics, deodorizing fab-

rics, breathable fabrics, insect killer clothing, hazard warning clothing, functional sportswear, etc. According to Hedge, "innovations in these sectors create significant demand for functional clothing which has a massive impact on today's fashion trends" (Hegde, 2015: 3).

Simultaneously, market analytics are talking about "the uncertainty of consumer receptivity" (Wearable technology in Industry verticals 2014-2019, 2015). In 2006 researchers describe the field of smart clothes as "twofold": driven by technology, and by art and Haute Couture. "In both cases clothing neglects the needs and wants of customers and the requirements of daily use" (Steffen, Adler and Weber Martin, 2006: 79). Despite the fact that this statement has been made a decade ago, it is still valid for the modern situation on the field. The more recent report about the EU-projects within smart textiles and clothing shows "the faith in technology as a solution on a number of problems, which all of them are based on speculations rather than thoroughly investigations about the real need for technology". The author of the study, L. Berglin from the Swedish School of Textile, tells that "expectancy that smart textiles concern mass consumption and mass production" is "not necessarily the case" (2013: 4). "Despite a rather extensive research effort the industrial and commercial activities are still in its infancy", Berglin has concluded (24).

Till now the popularity of wearables is limited to a number of gadgets as smart watches and fitness bands, health and self-care wearable devices. Substantially, all these "smart attires" are in use of early adopters; "a lot of wearables at the moment are selling gimmick", says co-founder of Intelligent Textiles A. Thompson (In Bearne, 2015). Mass production of smart fashion items is still out of question.

Discourse and framing studies

"In order to successfully introduce smart textiles in fashion there is a need for a multitude of methodologies. Areas like art, technologies, social science, for example, need to be combined in order to transform technology into meaningful form of use", Berglin pointed out (2013: 4). We will take liberty to add that without a systematic and properly framed coverage of the subject in the mass media, it will be very difficult for the hi-tech fashion to find its way to the mass consumer.

Researchers emphasize the crucial role of the mass media in the fashion discourse, where the media has been seen as "an important basis of the ideology of consumption". "Fashion discourses indoctrinate consumers in this ideology of consumption" (Thompson and Haytko, 1997: 16). From this perspective, we hypothesize that the existing way of smart fashion framing is still too lopsided and does not provide the adoptable image of smart wearables for the average consumer. We use the term "average consumer" in the same way as "later adopters" and as an opposite to "innovators" and "early adopters" (Martinez and Polo, 1996).

The contemporary understanding of framing effects is bound to behavioural or attitudinal outcomes of mass-media communication. These effects are "not due to differences in what is being communicated, but rather to variations in how a given piece of information is being presented (or framed) in public discourse" (Scheufele and Lyengar, 2014).

"A frame is an attribute of the object under consideration because it describes the object" (McCombs, 2005: 546). McCombs points out two distinct types of attributes – aspects and central themes. The latter, "frames", define a dominant perspective on an object.

According to M. Entman, "Framing essentially involves selection and salience. To frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for item described" (Entman, 1993: 52).

Entman gave a definition, which has an important methodological and "instrumental" meaning for the construction of our measurement instruments – content analysis and the coding system. The scholar said, "Frames, then, *define problems* – determine what causal agent is doing with what costs and benefits,

usually measured in terms of common cultural values; *diagnose causes* identify the forces creating the problem; *make moral judgements* – evaluate causal agents and their effects; and *suggest remedies* – offer and justify treatments for the problems and predict their likely effects. A single sentence may perform more than one of these four framing functions, although many sentences in a text may perform none of them. And a frame in any particular text may not necessarily include all four functions" (1993: 52).

Discourse as a concept is central to the methodology of our content analysis. According to Fairclough, "Different discourses are different perspectives on the world, and they are associated with the different relations people have to the world" (2003: 124). Discourse analysis helps to understand how the mass media texts represent aspects of the world and how they are linked to power relations in the society. In our research, we have had to deal with at least two main discourses in the texts: fashion and technological.

In order to develop the coding system for our research the three-dimensional model of critical discourse analysis (CDA) has been applied. After Fairclough, Jorgensen and Phillips explained that '...every instance of language use is a communicative event consisting of three dimensions:

> it is a *text* (speech, writing, visual image or a combination of these);
>
> it is a *discursive practice* which involves the production and consumption of texts; and
>
> it is a social practice" (2002: 68).

All these dimensions have been converted in to our codebook as far as it was possible. Not all elements of discursive and social practices manifest itself in the text; analysis of these extra-textual elements has been not included in the present paper[1]

The project "Smart fashion"

How has smart fashion been presented in the modern mass media? What do consumers think about the integration of vogue and technology? These research questions have been formulated as a part of the bigger project – Smart Fashion – where students and researchers of the Fashion Technology Lab (Amsterdam Creative Industries Network) have tried to find out whether it is possible to combine fashion and hi-tech, aesthetics and functionality. While the team of the Amsterdam University of Applied Science was busy with prototypes, the students of the Inholland University of Applied Science were conducting a series of interviews with consumers. The study of the way of media-presentation was organised in the traditional academic manner and was done by the researcher of Inholland. In this papers we are going to present the results of the content analysis of the media publications about the subject of interest.

Methodology

To understand how the smart fashion topic has been translated to the public, we have conducted content analysis. The articles with queries as *intelligent clothing, smart fabrics, futuristic clothing, e-textile, high-tech shoes,* etc. have been collected from LexisNexis database. Initially, no time limitations were chosen, the first sample included 448 relevant publications in English with the following distribution by search terms (Fig. 1). From 448 relevant publications, 100 most recent (2015—2016) texts with the same distributive correlation between the topics (search terms) were selected for the further coding. All texts have been processed manually through the MaxQDA software.

1 For instance, analysis of the interviews with consumers could make the description of the relevant discursive and social practices more meaningful. Still, the quality of the interviews

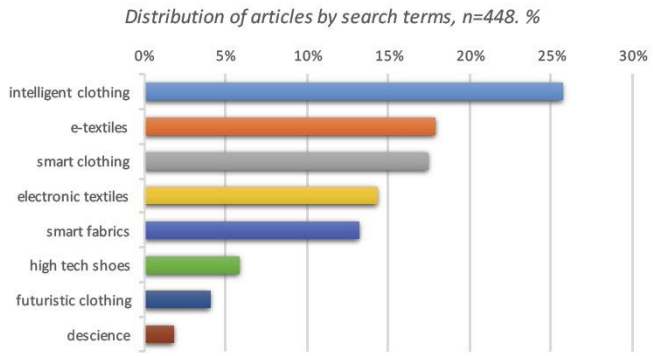

Figure 1. Distribution of articles from Lexis Nexis by search terms conducted by students during our project is good for the learning goals and not high enough for the conditions of reliability of our research.

For the coding different methods have been used: In Vivo, Initial, Provisional codes for the first cycle coding and Pattern and Theoretical coding for the second cycle (Saldaña, 2013).

Results

The code system for the content analysis has been resulted in the list of the following major categories: "main subject of article"; "genre of article"; "geography"; "actors of social practices"; "consumer values & experience"; "discourses". The last category includes "fashion discourse", "technological discourse" and "another discourse by market sector".

Main subject of article (Figure 2). The latest innovations in smart textile have been most common subject of the journalist's messages when they reported about wearables. Herewith, the news about a scientifical and technological invention, or about a new product relies accounted for nearly a third of the posts in this category (all four types of garments from the classification of Steffen, Adler and Weber Martin (2013) have been presented in the corpus). The review of the marketing research together with the reports from all kind textile shows & exhibitions formed another third of the corpus. The rest consists of the publications about collaboration between designers and scientists, about educational programs for students and children, about research programs of the EU etc.

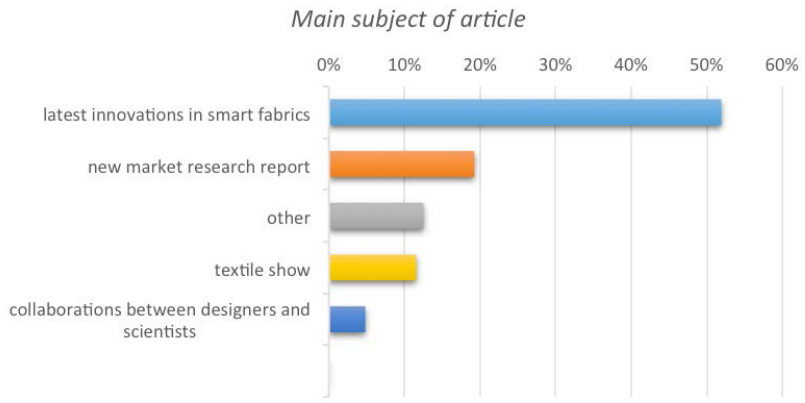

Figure 2. Main subject of articles

Genre of article. The first place belongs to feature article – commonly between 400 and 600 words, description of a new product or a number of products, discovery or research program. These texts give more space for explanations, pieces of interviews, historical references and other genre elements, what makes texts more information-rich. On the second place is a review of a new market research report; most of these texts

have a pure informative character and address the audience to the further reading via a hyperlink to the primary source. Genres of the announcement, news article and trends overview, shared the third place of popularity among the texts about the smart clothing.

Geography. Under this category we have coded the country and the production company(s) mentioned in texts. US is the absolute leader when it goes about the development in the wearables field; Europe, with UK as its pacesetter, stands a little behind; Asia-Pacific region has been also named regularly in the coded texts (it is hard to say which country in Asia is a leader, all mentioned countries – China, India, Japan, Pakistan and Shi-Lanka – got more or less the same amount of attention in the world press).

All companies mentioned in coded texts have been divided in 3 sub categories (in descending order of the number of coded elements): small and medium-sized start-up companies (with Sensoria Inc. as a leader); big clothing retailers, production companies, fashion- and ware- houses (with Adidas, Ralph Lauren and Nike at the head) and hi-tech multinationals (with Google, Samsung, Intel and Du Pont as most popular members of the article discourse).

Actors of social practices. Under "actors" we understand people and organisations, which are involved in the discursive practices under the study. In our case this coding category has been resulted in the following number of sub nominations: "professionals", "NGO's and research centres", "representatives of business field", "experts", "government" and "consumers". The distribution of these sub codes has been shown in the Figure 3.

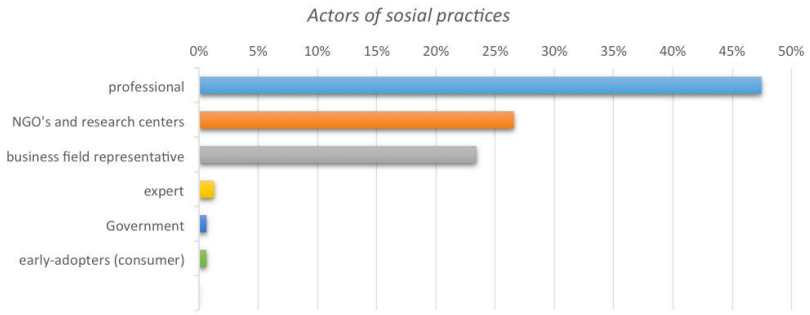

Figure 3. Actors of social practices

To give more detailed idea of what kind of "players" one can see on the field of smart fashion, there are some examples: first of all, professionals as university researchers, engineers, and designers take a word; they are followed by educators and design students. Sometimes market researchers give a comment or a prediction. Experts in market of wearables and/or fashion gave their estimates on the future development of the field. Representatives of production companies, inventors of innovation technology and organizers of smart textile shows, are telling the readers about their creations etc. All these players present the inside view of the field of the smart products. Other types of professionals, such as artists or bloggers, perform the function of a public opinion. Nevertheless, the very essential player of the field has been forgotten – the end- user of a product, consumer, has been hardly mentioned in the coded corpus. Government organisations have been also very purely represented.

Discourses. Texts about the topic can be described as a *multi-discursive*, where the technological discourse has been explored most intensive, followed by the fashion discourse.

Against our expectations, the economical context has been also rich presented in the items about e-mode. Most popular topic in this category is "investments". The "medical & healthcare" and "sport & fitness" have been illuminated as the most common fields of use of the innovative clothing and gadgets. Usage in worker, military wear, as well as maintenance of mobile apps, has been also often described. The narrative about the future is a common place in the coded texts.

The lion share of the *technological discourse* in the studied corpus is devoted to the new technologies – what is this? How does it work? How it can be implemented? What can it do? Etc. Main qualities (breathability, washability, self-cleaning ability, and so on) and options (motion, touch, pressure, lighting, etc.) have been usually mentioned and described with different grade of particularity.

The *discourse of fashion* has been presented, but not in the way what we used to see in the conventional fashion magazines (Moeran, 2013). The difference can be seen not so much in the elements of the fashion discourse (they are all presented in the corpus – "item", "catwalk", "designer's story", "brand", "price" etc.), as in an emphasis in the narrative. Remarkably, from 315 units coded as fashion discourse, not more than 25 text fragments have something to do with aesthetic sense of the described smart apparel. When it is the case, we see the text about the designer's models made for the "red carpet" or for the fashion show. "One of a kind" items, showpieces for a museum, and experimental prototypes have been described in the terms of "look", "silhouette", "patrons" and "style". All these elements are missing in the stories about workout wear, smart lifestyle and medical attachments. Aesthetical description of "detail" gives its way to technical specification of the item; the talk about functionality became most important in the text. This last observation is still consistent with one of the conclusions made by Berglin in 2013 about the focus of EU-projects on "technical aspects of clothing rather than fashion" (26).

Anyhow, journalists have reported the signs of convergence between technology and fashion. The best example of such cooperation is the project Descience. "[Scientists and designers] think, develop, and create in very similar ways, but it has never been put together," said the project representative. "Fashion is an amazing visual language, and fashion designers are amazing translators for scientists to communicate their work in a completely different way" (Li, 2015).

Consumer values & experience. From 1636 coded units, only 40 fall under this category. The consumer's concern has been mentioned in positive (16) and in the negative (20) manner. Different types of doubts and distrust expressed in the posts, together with descriptions of unpleasant user experience, have been qualified as "negative". Under the code "positive" we have placed the demonstration of good expectations (for example, "reduce of health costs"), affordability, and other positive qualities of smart item.

Remarkably, when consumers speak, they find wearables "too invasive", "mind blowing", and "a media-hype"; the public wants to know "how technology will change our life" and is worrying about privacy and safety of personal data. All these fears and uncertainty are growing in the context of the public discourse. The way in which the innovations described in the media has an impact on the public attitude.

When you read about smart fashion in the specialised media, as "Wearable Style News" or hi- tech blogs, you got an impression that everybody are already busy with wearables and that smart clothes have reach mass consumer already. This is forgivable for the specialised media as long they are oriented to the special reader (early adopter). But the same optimistic tone we see very often in the media oriented to mass audience, in other words, to the average, mass consumer.

SNN Wire spread out: "Tech companies are unveiling smart watches and bracelets at a rapid-fire pace, but for many designers, that's already last season. Get ready for solar dresses, 3D-printed bras and GPS-enabled blazers" (O'Brien, 2014). "This year prepare to see creativity combined with tech becoming more mainstream. Everyone will be doing it", said Zoe Philpott, interactive storyteller and creator of *Ada.Ada.Ada* in the interview for Guardian (Bearne, 2015).

Nevertheless, with all these positive news on the background, the natural actor of the above- mentioned social practice – average consumer – remains indifferent or suspicious for all these "gimmicks", "bonkers" and "descience" creations. No wonder, if even designers themselves cannot always explain clearly what is the benefits of their creations. So, Italian company Footmoov made shoes that contain sensors connected to a phone via We-Fi. "Why? Good question — one Footmoov themselves haven't completely figured out just yet", pointed the journalist out (Kinney, 2016). Sometimes the explanation of supposed practical application sounds at list odd: "the students who designed this futuristic glove believe it could transform the

lives of the deaf" (Deutsche Presse-Agentur, 2015). Or: "There is also a 'Running Pack' that changes colors based on your performance, and a 'Connection Pack' so that you can copy friends or celebrities. (Zolfaghariefard, 2015). After description of a number intelligent items, Canadian reporter have concluded, "Whether this much intel will become fashion's next big thing is hard to imagine, even in this Information Age" (Von Hahn, 2015).

Expectations of a certain kind have been provoked in symptomatic headlines such as "Rice of the machines" (Kanjilal, 2015), "Back to the Future" the predictions that came true (Midgley, 2015), "The Devil Wears Pulsars" (Li, 2015). Non-realistic and fiction tone became even more strong when narrator begins the text from the constructions such as "imagine..." ("Imagine your clothes rigged with self airconditioning!" (Apparel Online, 2015)), which is regularly in use by authors writing about hi-tech fashion.

There is one more aspect that we need to take in consideration – clothing and self-image. "Apparel marketers ... try to reach the fashion innovators through the mass media and depend on them to legitimize fashion for later adopters", says Goldsmith and Moore (1999; 12). And the same time, "new styles that are congruent with fashion innovator self-image should form longer-lasting trends than these appealing simply to the desire for novelty". Our content analysis demonstrates that the most media publications go not further than this simple desire.

Conclusion

Right now, the mass media frames smart fashion as a niche market for minorities. In the same time this picture is a part of fashion discourse, which consumers adapt to their individual vision of fashion and its consumption (Thompson and Haytko, 1997). According to recent survey by The NPD Group, there is a growing interest among the consumers in "more established fabric technologies in activewear" and "a growing desire for newer advancements in smart fabrics" (Feitelberg, 2015). To "translate" this "growing interest" in to profitable production for mass consumption the players of the smart fashion field need to involve the public in the play. Till now an average consumer remains a passive observer of futuristic experiments. The niche market is almost limited to a number of gadgets, fancy adds to sportswear, and medical equipment's.

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Abstract: Design Practice and Craftsmanship: Reimagining the Craft Sector in India

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KEYWORDS

Design practice, craft; education, innovation, empowerment

ABSTRACT

"If we loved and understood Indian art we should know that even now the Indian Craftsman could, if we would let him, build for us and clothe us in ways of beauty that could not be attained to in modern Europe for-any expenditure of money at all."

— Ananda Coomaraswamy

Design practice in the craft sector of India, has witnessed a paradigm shift in the last decade. There have increasingly been attempts to include the rural craftsperson in the creative process. Various design schools, scholars, individuals, organisations and Government agencies have integrated the design process with the grassroots by working closely with the makers of hand crafted products.

The approach for craft innovation in India during the colonial rule and later after independence has been a top down model where a designer/Institution/organization provides design to the craft sector through trained professionals. Institutes like Kala Raksha Vidyalaya, Bamboo and Cane Development Institute; The Handloom School, Somaiya Kala Vidya and research projects of James Father are alternately based on design creation by craftspersons.

This paper aims to compare the top down and bottom up approach being practiced to introduce design to Indian craftspersons. A comparative analysis of the challenges and advantages of these different methods would be done to understand empowerment of the craftsperson through enhanced earnings, livelihood, and social status.

The detailed information collated about the agencies involved in education for the sector would also be compared to arrive at the structure of various pedagogy frameworks employed. An analysis of the methodologies employed by them for incorporating design in the craft sector would be undertaken.

Both Primary and secondary data are used to study the frameworks employed in the sector for this research. The tools used for the data collection included field observation, immersion, interviews, etc. Secondary research also included data available with government, non-government bodies, literature survey of libraries and studies that have been undertaken in the area and related subjects.

Rewriting History: Contemporary Reworking of Historical 1970's Fashion Colours

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Trend, fashion, forecasting, cycles, colour

ABSTRACT

Fashion thrives on the thrill of the new, it is the intrinsic nature of the industry to constantly evolve and introduce new ideas. The very meaning of the word trend is an ancient one and can be traced back to Middle English and High German where its meaning was to turn, spin or revolve (Raymond, 2010), with many fashion trends, styles and colours revolving in and out of favour. However, the seasonal fashion trends introduced are not always quite 'new', conversely they may comprise a revival of other styles and eras, such as the sudden trend for 1960's style precipitated in 2007 by the popular TV drama Mad Men set in the era (Hidefi, 2012).

The trends for Autumn/Winter 2015/16 demonstrated the cyclical nature of fashion; the key reference points were the 1970's in colour, garment silhouette, fabrication and accessories. During the Seventies there was a period of considerable change in the development of colour trend forecasting (Blaszczyk, 2012), with an explosion of colour for the mass fashion market and the development of the modern trend forecasting industry as we know it today. The key research question focuses on how does a fashion style, movement or decade become reinterpreted for contemporary consumers and can such a revival ever be a true representation of the era? Today's trend forecasters use in depth research, observation and analysis to construct their concepts (Sheppard, 2015), surely this extends to historical archive materials to ensure such an accurate representation?

In order to answer the research question posed, the paper examines the origins of the most recent Seventies revival in terms of categorisation of colour and styling, mapping evidence to construct the timeline for the revival and the frequency of iterations of trends in recent times against the early 1970's. Examination of garments from the period was conducted using the Marks and Spencer Archive, ostensibly to determine how contemporary mass market 1970's colours compare to contemporary revival colour palettes. Results from the analysis of several contemporary colour forecasts which represented the revival for 2015/16 will confirm the accuracy of contemporary colours in representing the actual colours of the era.

Introduction

The cyclical nature of fashion, as expounded by Raymond (2012) and in colour terms by Brannon (2000) has been well documented, as designers work in a magpie fashion, sourcing inspiration from diverse eras, themes and cultures. In particular, pattern and colour are fundamental to the evocation of a specific time period or fashion movement, although specific colours have a particular association or resonance with specific styles or eras. Dickinson (2011) believes:

> *'If black is style and sophistication then colour is fashion.'* Dickinson (2011:178)

Fortunately fashions change, and the 1970s has a very strong association in the psyche of the general populous, in particular the colours of the time, rightly or wrongly. It has been widely acknowledged as being notable for browns, oranges, avocados, purples and acid shades (Scully, Johnston Cobb, 2010), yet other colours were obviously also available during the time period, and colours changed throughout the 1970s, what was deemed fashionable in the early part of the decade had changed irrevocably by the late 1970's, in the UK in particular, with the advent of punk and it's anarchic, nihilistic attitude to fashion. Further research has shown there is a slow evolution and adoption of such trends over a period of time, the bell curve model has been used to illustrate how a trend can be adopted early by a few fashion innovators, slowly growing until it is accepted by the mass market, reaching its peak before seeing a mirrored level in decline. Some believe colour cycles can be plotted and follow specific repetitive patterns (Brannon, 2000, King, 2012), even repeating on a regular basis over a predetermined number of years, typically a seven year cycle; the most recent incarnation of the 1970's in colour and fashion terms was in the early 2000's. American forecaster Roseanne Forde believes:

> *'So much of what is going to happen in the future is intimately connected to and influenced by the present and the past.' (Scully, Johnston Cobb, 2010: 96)*

But if colour is an indicator of the zeitgeist of the era, just how reliable is this when inspiration is often taken from film or photographic materials which may inaccurately depict colour of the era?

The research methodology centred on the study of original garments from the early 1970s from the Marks and Spencer Archive, based at Leeds Metropolitan University, to establish what the mass market colours of the era were and how they correspond with contemporary revivalist 70's colours. By conducting a comparative analysis of the colours, Pantone referencing each one found, and cross referencing with contemporary 70's revivalist colour palettes, the key research question was created, whether or not a 70's revival is a radical reinterpretation or a faithful reproduction of the colours of the original era. Comparing original and contemporary forecasted colours for the revival in 2014/15 from two major trend prediction sources would provide the initial findings.

Developing inspiration from a range of eras is unremarkable, indeed, the fashions of the Seventies were in turn influenced by a variety of fashion from different eras. The 1950s were revived in the early 1970s (Brannon, 2000), as were the 1940s and even the 1930s (Wilson: 1989). In response the Seventies have witnessed at least two modern day fashion revivals of their own, prior to the current trend; in the 1990s and again in early 2000s (Brannon, 2000). Clearly some dilution of key elements of early Seventies style is to be expected, as in turn the designers and retailers of the early Seventies were selective in their range of influences from diverse eras and fashion styles.

To appreciate the polarity of the contemporary fashion forecasting industry and that of its' 1970's counterpart, it is essential to understand the fashion industry of the time. During the period there were fewer trend forecasting providers in comparison to the current market, fashion trends and the speed to market moved far slower, with dominant fibre companies who produced colour trends each season, resulting in little diversity. McKelvey and Munslow (2008:1) suggest that there was a shift from the 1960's onwards.

'During the post war period, forecasting companies compiled stories and themes each season that were easier to predict. Themes were also more predictable and often fell into evolving stories that reflected the slower moving trends of the time'

From a socio-economic perspective the world economy was in turmoil, the relatively affluent period of the late 1960's had passed and in the UK the oil crisis of 1973 and the coal miners' strike in 1974 resulted in a power cuts and shorter working weeks. Consequently, fashion around the time reacted to the austerity of

everyday life and embraced retro-chic, glam rock and ethnic styles, resulting in a broad range of colours and fabrics adopted by the fashion industry (Wilson, 1989). The preconception surrounding the dominant colours employed in fashion and interiors in the 1970's often encompass the colours reflected in such inspirations, browns, oranges, purples, avocado and yellows. Brannon (2000) mentions a popular sunshine yellow used in 1971, and a range of earthy tones influenced by the hippy movement, and these are the basis upon which perceptions of original Seventies colours are based upon.

Research Methodology

In order to test the validity of revivalist colours faithfully reproducing the original, a number of printed dresses from the early 1970's were selected to view from the Marks and Spencer archive. These were initially selected using the online catalogue, and chosen for the diversity of colours within the printed fabrics and the year of manufacture. The garments were then photographed during visits to the archive, and referenced against pantone textile colours. The same lighting and positioning was used for each garment selected, so as to ensure parity across the sample.

The dresses consisted of half short and half maxi dresses, suitable for day wear and all with a minimum of 5 colours within the print design. The prints were examined and a range of colours extracted from each dress and Pantone referenced in order to compile a colour palette for each year from 1970 – 1974, based on the year in which the garments were on sale in store. The resulting colour palettes were compared to palettes forecasted for A/W 2014/15 by French forecasting company Promostyl, one of the leading trend and colour forecasters, ironically established since the mid 1970s, and those forecasted by of colour specialists Pantone. During the research it became evident that the revival of the Seventies in fashion had started earlier than initially anticipated in 2014, as the forecasters would have initially discussed their ideas for that season up to 2 years earlier (King, 2012). However, the influences of the 1970's continued to be popular during Summer 2016, although their impact is now waning, as all trends eventually make way for newer, fresher looks. The influences of the 1970's evidently started far earlier than summer 2014, with Trend Analyst Li Edelkoort suggesting that commentators can be mistaken in their rush to label ideas and in particular, colour combinations, as revivals of specific eras. As early as 2008 when she noted that traces of the revival were being reported:

> *'With a surge of brights parading the catwalk....it is easy to mistake this colourful movement as a revival. Most fashion magazines have already labelled the colour comeback as a return to the 60's and early 70's.' Edelkoot (2008)*

Online trend specialist WGSN identified the trend for 1970s more specifically in their Nostalgic 1970s report, first published in August 2014 for the Autumn/Winter 2014/15 season when they identified how 'designers look back to give collections nostalgic 1970s silhouettes featuring

authentic details and colours such as top-stitching and warm browns' (WGSN, 2014) The era continued to be influential into Summer 2016 and Evans (2015) cited prints as being a particular area of influence, with catwalk collections from Alberta Ferretti, Valentino and Gucci s promoting the theme through print, crochet and silhouette. The key colours were identified as vivid brights, rich darks including marsala, the Pantone colour of the year 2015, all paired with white.

> *'A sea change is in the air. As fashion drifts away from the flower-power boho of the 1970s we are starting to see a new mood come into play.' Evans (2015)*

In early 2014 Promostyl published their Autumn/Winter 2014/15 trendbook for women which featured four key trends, of which the Curator trend followed the 1970s theme, specifically mentioning 'interior decoration of the 70's with its iconic colours and motifs inspires edgy elegance.' Promostyl (2014:73). Concurrently, Pantone's colour report for 2015 noted that the season was selecting inspiration from a number of eras, as

the Seventies originally did, from 'moments in American history – from the seductive '20s to the bohemian hippie and modernists of the '60s and '70s'. Their theme also featured some of the stereotypical early 1970's colours mentioned previously by Scully and Johnston Cobb (2010), warm reds and oranges, greens and browns, with base colours including black, white and ecru. In order to assess the contemporary versions of the revivalist colours, further work was carried out to identify colours used in the dresses from the Marks and Spencer Archive, all from the early 1970's.

Typical Early 1970's Colour Palettes

The key elements of the research were conducted at the Marks and Spencer Archive held at The University of Leeds. A sample of seven printed dresses from 1970 – 1974 were selected and examined. Each dress was photographed, as was the printed fabric in order to establish a close up detail of the pattern. Each colour identified in the dress fabrics were then colour matched by eye using the Pantone Textile fan. In order to maintain the same conditions of lighting, the garments were inspected in the same position using the same lighting each time. A series of colour palettes were developed, one from each garment, reflecting the colours identified within the printed fabrics. The base colour of the fabric was also taken into consideration if it was visible and integral to the print.

However, there were differences within the exterior lighting experienced at different times of day and this should also be considered as a variable.

Whilst most dresses were constructed using a printed fabric, one knitted dress was also selected and the colours examined within the knitted construction of the dress. Other variables to be considered as a part of the study included the variation in fabrics and their light absorption and reflection properties, and the potential degradation of colour over time. It has also to be considered that Marks and Spencer, although a major UK retailer, would not necessarily represent the full range of colours on offer at any particular time. The resulting colour palettes were subsequently compared with the Promostyl colour palettes and those of Pantone from Autumn/Winter 2014/15 to establish whether there was any synergy between the original Seventies colours identified and the contemporary colour palettes of the recent revival of the era. Both companies provide Pantone colour references for their colour palettes, so there was parity between the colour naming systems.

Results

As one would expect, there was substantial variation in the colour palettes created by each dress. It was impossible to assess the dresses in the context of a full range of coordinated garments which would have been available at the same time as the archive is not sufficiently extensive to allow such a study. There was no way of knowing from the archive which pieces were in store at the same time, other than a generic summer or winter label, and consequently many assumptions have had to be made throughout the study. Had a wider range of garments from the same season been available for sampling, it would have allowed for a greater range of colours to be extracted from the year of garment origin. Typically a full garment range plan would comprise a number of dresses, skirts and tops, outerwear pieces such as coats and jackets too, utilising knitted and woven fabrics plus coordinates, which would all complement one another and use most of the same colours from a particular colour palette. Also of note was the fact that other than base or outline colours such as white or black, all the dresses had very different colour compositions, resulting in a range of 33 colours in total across 7 dresses. Both the Promostyl and Pantone colour palettes were far more restricted, featuring 11 and 10 colours respectively.

None the less it was surprising to find that relatively few correlations could be made with the contemporary revivalist colours developed for A/W 2014/15 by Promostyl and the colours from the archive dresses. Promostyl compiled a palette of 11 colours including white and a dark charcoal grey, plus ecru for their Seven-

ties themed colour and print story. Although many of the archive dresses did feature either a white or ecru base, or incorporated black to create outlines for some of the patterns, most of the remaining colours predicted by Promostyl did not appear together or as a part of the various colour palettes generated from the archive dresses... The original Seventies colours identified from the archive featured oranges and yellows, plus browns, but did not accurately match any of the contemporary colours predicted by Promostyl, whose colours were far lighter than the originals.

Whilst there were a significant range of colours in the pink, purple and greens spectrum within the garments from the archive, these did not feature at all in the contemporary palette, although Promostyl did suggest one mid blue, Le Corbusier Blue. On closer inspection, this could not be matched to any of the blues found in the range of dresses examined. Pantone proposed a similar blue to Promostyl's Le Corbusier, which again did not match any of the blues from the archive dresses.

Overall, the Pantone colours for Winter 2014/15 provided somewhat different results. The Pantone palette featured ten colours and many were similar to colours used in the archive palettes; one in particular, Radiant Orchid, was an exact match to a violet featured in Dress 6 from the archive, and many other colours featured in the dresses were close to 60% of the Pantone predicted colours... The Pantone colours reflected far more of the original Seventies archive colours than Promostyl, although browns and oranges took on a slightly different hue. However, the grouping was close enough to see immediate correlation to 4 of the dresses from the archive. This could be explained by several reasons, perhaps Pantone used their own archive to research the original colours, perhaps their magpie approach to the season resulted in a broader range of colours being proposed, rather than a more modernist approach to colour palette development, which Promostyl may have proposed.

This poses an interesting conundrum regarding colour forecasting in general, and not specifically related to the quest for authenticity within the revivalist colours. How can two major forecasters provide such different reinterpretations of a well-known era as the Seventies? We have to consider the palettes were promoted slightly differently, Promostyl's were exclusively for womenswear, whilst Pantone's were more generic on trend colours for a broader product range and market level. This could be the answer; our image of the early Seventies is bound upon with not only fashion but a broad spectrum of other related products, the avocado bathroom suite, the brown and orange sofas and the multi-coloured wallpapers of the time.

Conclusions

It is apparent that the Seventies remains a strong influence for fashion designers, particularly the first half of the decade. The trend revival which started in 2014/15 continued into Summer 2016, but now appears to be giving way to other eras of influence. As far back as 2008 forecasters initially identified a potential return to colours of the 70's and such a long period of sustained interest the trend has had time to develop and to morph in to an alternative version of the original colours used. The range of archive dresses sampled indicated a broad range of colours were prevalent in a period between 1970 and 1974 in mainstream fashion of the time in the UK, as is the case with contemporary fashion colour. From the Promostyl forecast publication used there were four themes promoted, each with 11 colours to choose from, but only one theme directly referenced the 1970s era.

Nevertheless, it is interesting to note the contemporary interpretation of the modern day colours bears little resemblance to the original colours present in the Marks and Spencer archive pieces. A better result could have been achieved by using a larger garment sample, not wholly sourced from the Marks and Spencer archive but from a range of other brands available on the UK high street at the time.

Conversely, by comparing a broader range of trend predictions for the season, it may have been possible to identify additional correlations in colour palettes from the original era and the contemporary revival. It was also apparent that different forecasters had developed very different palettes, and only one of these resembled the original archive colours in any way.

What has been discovered is that although today's designers and trend forecasters may often refer to original Seventies fashion colours, they are not always accurate representations of what transpired in fashion during the period, merely an approximate construct of the era. We may have a stereotypical image of Seventies fashion colours which were prevalent in the media of the day, but did not accurately reflect society at the time, and in particular, mass market fashion.

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Exploring Chinese Fashion Identity: a New Perspective

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KEYWORDS

Chinese fashion, Chineseness, hybridity, identity, sustainability

ABSTRACT

This paper challenges the essentialist conceptualisation of Chinese fashion and brings fresh insights to the discussion of Chinese fashion identity against the backdrop of globalisation. Moving away from an essentialists approach to researching Chinese fashion, this paper takes an alternative position to address the research agenda through the mobilisation of Giddens' theory of reflexive identity formation, privileging individuals' agency and reflexivity. This study draws evidence from published narratives of nine established Chinese designers. In line with Giddens' concept of "reflexive project of the self", this study uses a narrative methodology. Thematic analysis is adopted to identify and investigate common themes across the whole dataset. At the centre of the analysis is individuals'

self-articulation of their perceptions, experiences and themselves in relation to culture, fashion and identity. The finding indicates that fashion designer's identity is constructed around anchors such as agency, cultural hybridity and sustainability rather than traditional collective categories such as culture and ethnicity. The resulting designers' narratives are defined by agency, reflexivity, hybridity, plurality, and sustainability, which reshape the global perception of Chinese fashion.

Introduction

The contemporary fashion industry has witnessed the global rise of Chinese fashion designers. China plays more and more important role in world fashion industry. One of the key debates in contemporary time is the conception of Chinese fashion (*e.g.* Reinach 2012). As such, Chinese fashion has received attention in fields such as fashion theory, sociology of fashion, history of fashion (*e.g.* Tsui 2015, 2010; Lindgren 2013; Reinach 2012; Finnane 2008; Keane 2007; Bao 2008; Peng 2011; Steele and Major 1999; Wu 2009; Zhang 2010), fashion marketing, luxury brand management (*e.g.* Radclyffe-Thomas and Radclyffe-Thomas 2015; Welter and Mead 2015; Chadha and Husband 2006; Zhiyan *et. al.* 2013; Bian and Veloutsou 2007; Gilmore and Dumont 2003; Henderson *et. al.* 2003), and sustainable fashion (Rahman and Gong 2016).

A close look at previous discussion on Chinese fashion reveals that most of them are explored through the lens of cultural knowledge and assumptions, using the dichotomous models of East and West (*e.g.* Radclyffe-Thomas and Radclyffe-Thomas 2015). The results of these studies generate an essentialist and stereotyped notion of Chineseness and Chinese fashion. It can be argued that this approach offers a very limited view of the situation. The present study, in contrast, has potential to produce more nuanced understandings on Chinese fashion identity. It challenges the essentialist conceptualization and brings fresh insights to the discussion of Chinese fashion identity against the backdrop of globalisation and westernisation. Different from a culturalist approach to researching

Chinese fashion, this paper talks an alternative position to address the research agenda through the mobilisation of Giddens' (1991) theory of reflexive identity formation, privileging individuals' agency and reflexivity. This approach to the discussion of identity formation not only challenges the traditional view seeing identity as the distinctive and essential characteristics belonging to any given individual or shared by all members of a particular social category or group, but highlights fashion designers' strategic agency and their potential role as fashion activist.

This paper starts by reviewing the relevant literature on Chinese fashion identity and offering a justification for our choice of theoretical framework. A description of the methodology which guides this study will be put in place before discussing the themes emerging from an analysis of Chinese fashion designers' narratives which offer fresh insights on Chinese fashion identity.

Previous studies on chinese fashion

Research on Chinese fashion has been studied explicitly or implicitly within the bounds of existing paradigm such as orientalism and the binary of the East versus West. For example, anthropological dress scholar such as Clark (2000:65) discusses the history and development of the cheongsam (or Qipao), which is a garment reflective of tradition, modernity, fashion, cultural change, and ultimately Chinese identity. Various other writers, including Li (1998), observe that Chinese fashion designers in Hong Kong and Taiwan use Qipao as a strategy of conscious orientalising whilst Skov (2003) argues that this orientalising strategy may put designers in a bind (see also Hansen 2004:380).

Metzger (2014) stated that iconic Chinese objects such as the qipao dress and the Mao suit represent Chineseness for both Chinese and Western audiences, in terms of national identity, race, gender, and politics.

Theoretical underpinnings

The present study, with its focus on identity negotiation, is underpinned by Giddens' (1991) concept of "the reflexive project of the self" in which identity is seen as unfixed, fragmented, socially constructed, and reflexive. Consistent with the authors' aim to avoid 'othering', this approach challenges the notion of identity as categorised, essentialised, imposed and united. In Giddens' view, self-identity cannot be anchored in collective categories such as culture, race, gender, age or social class in a post-traditional world where viewpoints are no longer influenced by custom. Neither fixed nor given, it is best understood in terms of biographies.

According to Giddens (1991:5), in a post-traditional world where opinions are no longer considered to be influenced by long standing customs, self-identity is not anchored in traditional collective categories such as ethnicity, gender, age or social class. In other words, it is not something that is simply given, but rather is understood in terms "coherent, yet continuously revised, biographical narratives" (Giddens 1991:5). The emphasis, then, is on the role of narrative in understanding the Self, offering us a way to make sense of who we are. As Rose (1997:237) comments:

> *We use the stories of the self that our culture makes available to us, with their scenarios of emotions, their repertoires of motives, their cast-list of characters, to plan out our lives, to account for events and give them significance, to accord ourselves an identity as hero or victim, survivor or casualty within the plot of our own life, to shape our own conduct and understand that of others.*

The narrative created by an individual includes past memories and future plans in which private "stories" are shaped by the external sociocultural environment. According to Lawler (2008:13), for instance, narra-

tive "gives us a means to understand identity in its sociality, since narrative identity places us within a complex web of relationships [...]".

It might be argued, of course, that "reducing" identity to narratives undermines their potential as a sense-making tool. In other words, narratives about ourselves are important "but they are not the full, lived experience of engagement in practice" (Wenger 1998:151). However, proponents of narrative research recognise people as "self-articulated animals" (Taylor 1989), who make sense of life through articulating and reflecting upon their experiences. As Stivers (1993:412) points out:

> *The sense of self is an essentially narrative phenomenon; people conceive of themselves in terms of stories about their actions in the world, using them to make sense of the temporal flow of their lives. We find identity meaning as a result of the stories we tell about ourselves or that others tell about us. Therefore, a narrative approach to self-understanding is not a distortion of reality but a confirmation of it.*

Identity, then, is created and maintained through self-reflexivity or continuous self-observation and self-introspection (Giddens 1991:243). This process allows past biographical narratives to be interpreted from the standpoint of the present; it also plays an important part in accommodating new experiences, events and information. This view of identity formation, therefore, helps us break the bounds of reigning theoretical paradigm and brings a new perspective to the understanding of Chinese fashion identity.

Methodology

We use narrative methodology to analyse Chinese fashion designers' perceptions, experiences and inspirations. This approach offers the designer a chance to "speak" for themselves and show the depths and complexities of their experiences. The methodology which guides this study is broadly constructionist (e.g.Berger and Luckmann 1966; Burr 1995) and interpretive. By taking an interpretive epistemological stance, it is believed that knowledge can be gained through understanding the meaning of lived experiences (interpretive epistemology) (Carr and Kemmis 1986).

In line with Gidden's (1991) concept of "reflexive project of the self" or "storied life", this study uses a narrative methodology. Narratives (Connelly and Clandinin 2006, 2000, 1990; Polkinghorne 1988; Bruner 1987) are verbal accounts or stories relating to experiences of Chinese fashion designers. For Connelly and Clandinin (2006:375), narrative inquiry is "the study of experience as story"; it is "first and foremost a way of thinking about experience". As Brockmeier and Carbaugh (2001:1) argue, its importance lies in its "expressive embodiment of our experience, as a mode of communication, and as a form for understanding the world and ultimately ourselves".

The focus of narrative research, then, is on the individual, and the fact that life can be understood through a recounting and reconstruction of the life story or biographical narrative. Although the selected individuals are homogeneous in terms of their profession, their diversified demographic characteristics help build a fuller and more complete understanding of Chinese fashion identity. What the author seeks from this inquiry are personal and contextual details, the linking of stories with the broader social context where these stories were enacted and the "resonance" (Conle 1996) or dissonance readers may experience. Bearing in mind the "co-creating" nature and the "intersubjectivity" of narrative research, the author has endeavoured to avoid being "narcissistic and solipsistic" (Clandinin and Connelly 2000:181), and to present the authentic voices of the designers rather than letting our own opinions to dominate.

This study draws evidence from a textual analysis of published narrative of nine established Chinese designers such as Ma Ke, Masha Ma, Guo Pei, Qiu Hao, Uma Wang and Huishan Zhang. Details of source of the narratives (e.g. designers oral accounts) can be found in Appendix 1. In terms of literature search, the fol-

lowing keywords have been used including "Chinese fashion", "sustainablilty", "hybridity", "fashion identity", "Chineseness", "orientalism" and fashion designers' names. Thematic analysis (Braun and Clarke 2006) is adopted to identify and investigate common themes across the whole dataset.

Findings

Three inter-related themes – sustainability, redefining Chineseness and hybridity – emerge from an analysis of designers' narratives. We look at each in turn.

Sustainability

Sustainability emphasises the interdependence of human beings and the natural environment, and the interconnections between socioeconomic development and environmental protection (*e.g.* Shen *et al*. 2013). Sustainable fashion, in particular, can be defined as clothing that endorses fair trade principles with sweatshop-free labour conditions; that is environmental and social-friendly by using biodegradable and organic cotton, and is designed for a longer lifetime use; that is produced in an ethical production system, perhaps even locally; that makes use of eco-labelled or recycled materials (Fletcher 2008; Joergens 2006, see also Shen *et. al* 2013).

The first main theme, which emerges from designers' narratives, fashion brands and project's stories, concerns sustainable (or ethical or green) fashion (De Pelsmacke *et. al* 2005; Moisander 2007; Newholm and Shaw 2007). For example, Ma Ke is a highly regarded conceptual designer, who has received prestigious Prince Claus Award from Netherlands in 2008 for recognising her advocating socially, culturally and environmentally sensitive fashion design and production. Ma Ke is heavily influenced by Chinese philosophy such as Confucianism, Daoism and Buddhism and has been concentrating on her journey of self-actualisation (*e.g.*Tsui 2010). She intends to draw attention to the loss of the emotional bond or the long-term connection between the garment maker and the wear of clothes in the age of industrialized mass production and consumption (Hui 2015). She reflexively elaborated account on how she started doing eco fashion, therefore, form an important part of her identity narrative (Giddens 1991). Speaking of her deep connection with ecology, animal, child and nature, Ma Ke configured her narrative in a way which portrayed herself as a reflexive and caring designer with "sustainable thinking" (*e.g.* Black 2012):

Ma Ke: Maybe I was born an ecologist. Since I was a child, I've loved being in nature, surrounded by animals. My first professional idol was the British female zoologist Jane Goodall when I was seven or eight years old. After reading the story of her orangutang studies in the African jungle, I was eager to become a zoologist like her. I've had many animal companions since I was a child, and now I am living with seven grown dogs and three new- born puppies in my workshop. Living with animals brings me a profound understanding of how close and interdependent human beings are with nature. It is very important for establishing my view of creation[1].

Her sustainable designer identity is further consolidated by expressing her concerns over challenging issues faced by the fashion industry, such as environmental crisis (e.g. Anderson 2016), consumerism, industrialised mass-market production, and commercialisation, and affirming designers' social and environmental responsibility (e.g. Black 2012; Rinaldi and Testa 2014). In her words:

> *Believing that genuine fashion should not follow trends, but should uncover the extraordinary in the ordinary. In a world of conflict and never ending wars, of polarization between rich and poor, we face a deepening environmental crisis caused by the short sightedness of human activity. Our resources are running out, while our desires are proliferating. Cultural variety and region-*

[1] http://www.ecofashionworld.com/Designer-Profile/Useless-Design-by-Ma-Ke.html

al diversity are being assimilated through economic globalization. Traditional craftsmanship is disappearing from our daily life...Designers must be responsible for damage done to the eco system through their production, and must not work for purely commercial interest" [2]

Ma Ke advocates for fashion designers to initiate action by adopting the practice of the hands on engagement or design intervention to tackle environmental problems or ecological fragility caused by the textile and clothing industry. As such, Ma Ke reflexively positioned herself as a design activist (Fuad-Luke 2009) who promotes sustainable practice and believes power of design for the greater good of humankind and the natural environment.

In a similar vein, Yin Peng, a Chinese designer who accessorised models with smog masks at Mercedes-Benz China Fashion Week 2014, anchored his narrative identity around the notion of sustainability by emphasising his deep connection with nature environment. He told Sarah LeTrent at CNN:

"From my perspective, no matter how good the outside environment is, the key is how we mix the situation outside with our hearts." [3]

To sum up, this section has explored the significance of fashion clothing sustainability in relation to Chinese fashion identity formation. It illustrates how Chinese designers use sustain fashion as a resource to build their identity. Their collective narrative constructs an ethical and sustainable fashion identity, which advocates socially, culturally and environmentally sustainable design and production. Theoretically, it supports Lindgren (2013)'s findings that some well-established Chinese fashion designers have started incorporating intrinsic sustainable practice and design aesthetic.

Redefining Chineseness

The second overarching theme developed from designers' narratives concerns Chineseness. Fashion needs aspiration. New generation of Chinese designers naturally draw upon "Chineseness" as resource for creativity and inspiration. "Chineseness" is conventionally understood as the general look or impression of being Chinese or of Chinese origin, which is normally represented by iconic objects such as the Qipao dress and the Mao jacket (*e.g.* Metzger 2014) or cultural symbols such as dragon, phoenix and the colour red. Such a homogenised Chineseness is the imagination of the Occident (Western). This essentialised or stereotyped view suggests an overarching impression of nationally unified traits and characteristics, which fails to reflect the fluid, fragmented and multiple identities of people of Chinese origin. It is therefore not surprising that the designers' narratives on "Chineseness" highlight the complexity and plurality of this contested notion. For example, Guo Pei, China's homegrown haute couturier, who made the canary-yellow gown Rihanna wore at this year's Met Gala in New York, connects grandiosity and splendour with Chinese aesthetic:

"I hope that people can see China in many different angles. The impression China gives to the world today is a rapidly developing economy, cheap labor, and fast production. But China has 5,000 years of history and is very diverse.

But as to my work, the dresses take many hours - 50,000 hours for a dress called Magnificent Gold and 10,000 for a dress called Blue and Porcelain. The process of the production of the dress, it is a transfer of life itself. It is a work by the people of the past, they have devoted themselves and their time to the

[2] http://www.designcatwalk.com/ma-ke-chinese-fashion-masterpieces/

[3] http://edition.cnn.com/2014/10/31/living/smog-mask-china-fashion-week/index.html

work. The focus and the attention paid to this dress will make it remembered by the world — I want is to make them remember. I don't do this for profit. It is my responsibility to let the world know China's tradition and past, and to give the splendour of China a new expression. I hope that people do know China in this way" [4]

Guo Pei's reflexive accounts indicate her deep affection to China and her understanding of China and Chinese tradition which is characterised by splendour. By asserting her responsibility as a designer to promote and uphold what she understood as central features of Chinese tradition or Chineseness, she portrayed herself as a reflexive agent (Giddens 1991) who intends to refine the label of "made in China", which is conventionally associated with cheap and industrialised mass- market production.

Another Chinese designer, Qiu Hao trained at Central Saint Martins also contested the negative connotation of "made in China". In his words:

"Made in China' is not synonymous with low quality. For example, the workshop that produces our collections also makes collections for labels such as Celine and Nina Ricci.

Many buyers would be amazed by the exquisite techniques of Chinese machinists. Right now, I don't think 'Made in China' is any worse than 'Made in Italy' or anywhere else." (Fearon, 2013)

In addition, Chinese designers such as Huishan Zhang, Masha Ma and Yiyang Wang have started challenging the cultural stereotypes or essentialist and orientalist view of "Chineseness" (i.e. phoenix, dragon and the colour red) and doubting the stability of the fixed dualism such as "East" versus "West". For example, ambitious designer Huishan Zhang who is a Central Saint Martins graduate and based in London, argues against the essentialised view of Chineseness by asserting that "there's more to Chinese design than dragons, phoenixes and red"[5]. This way Huishan Zhang criticised the stereotyped view of China, which is not simply a neutral discourse, but reflects a form of cultural leadership which places Westerners in a superior position (Said 1978:7). It is a cognitive bias that creates fixed categories, which ignores the complicated nature of sociocultural, economic and geographical differences (Mahalingam 2003).

Finally, Uma Wang, an accomplished Chinese fashion designer, defines Chineseness in her own way by providing a distinctive account on Chinese ascetics that emphasises the feeling of space between body and clothes. She explained:

"The feeling of space means the body should not be constrained by clothing. There is a relation between body and clothes, especially when walking; the shape of the body comes out from the clothes vaguely. That's the state of beauty I am looking for, which [is] very Chinese." [6]

In short, designers' collective narratives indicate that they all look at their culture heritage for design novelty and innovation. However, the notion of Chineseness means different things to each of them. And the essentialist and orientalist imagery of China and Chineseness is challenged and resisted by the plurality of Chine-

[4] http://nymag.com/thecut/2015/04/chinese-couture-designer-releases-mac-collab.html

[5] http://streamingmuseum.org/when-chinese-fashion-designers-rule-the-world/

[6] Cherie Paris, Uma Wang Interview In Paris Fashion Week, April 23, 2012. Available at: http://streamingmuseum.org/when-chinese-fashion-designers-rule-the-world/

seness created within designers' "small narrative". Although all of them can be assigned to the social category of Chinese fashion designer, their belief/knowledge, emotions and narratives of their experience are very different. As such, it would seem that identity should not refer merely to a given social category, but is "something that has to be routinely created and sustained in the reflexive activities of the individual" (Giddens 1991:52), which is by no means homogenous.

Hybridity

The concept of 'cultural hybridity' was introduced by Homi Bhabha (1994) and then developed by other theorists such as Peter Burke (2009). In Bhabha (1994)'s view, the colliding of different cultures can result in the formation of a 'third space' (or "in-between" space), where something new are created. Hybridity can be used as an approach eschewing essentialism. In a way which reflected the complex nature of identity, the designers' narratives revealed that they constructed themselves to be "hybrid". As such, the designers provide their correction to the essentialised view of Chinese fashion and the dichotomous model of East versus West. For instance, Laurence Xu, who is considered as one of the top designers in China, asserted his appreciation of the values of both Chinese and Western cultural heritage by explaining to Gemma Williams (2015) during an interview that:

> *"I was born to be a fashion designer. I also carry a strong sense of purpose to promote the combination of Chinese and Western elements on the international stage."*

In a similar vein, another designer Liu Yang, considered one of the top fashion designers in China, elaborates his creations as a blend between East and West. In his words:

> *"Weaving the elegance from the East with the romance from the West is the eternal soul of my design." (Che, 2007)*

Hybrid ascetics is also featured in Huishan Zhang's design:

> *"The clothes are elegant, always with a special twist. A defining feature is that we use a lot of lace. That is our signature. The look is minimal, but always with lots of detail. We play around with the Chinese element. We want to mesh it into the design. It is always subtle. It might even be something inspired by Chinese philosophy that fits into the Western design aesthetic.* [7]

In particular, Huishan highlights his design novelty comes from the heritage of both Chinese and Western culture. He explained that "the whole brand is like a presentation of myself. The Chinese part is from my blood, and the European/Western influence is from what I'm experiencing" (Radclyff-Thomas, et. al. 2015). This way, Huishan's identity is defined by hybridity. In his words:

"My brand is about Chinese heritage meeting Western influence, that's how I define myself," he says. "I am a Chinese designer established in London, and my nationality definitely gives me an edge in the international fashion market." (Fearon, 2013)

Similarly, the concept of hybridity is the anchor upon which Masha Ma builds her identity. She says:

> *"I grew up in China and learned fashion at Central Saint Martins, so you will find Western aesthetics along with Chinese culture and philosophy in my design." (Fearon, 2013)*

[7] http://hashtaglegend.com/post/break-out-designer-guo-pei-turns-spotlight-mainland-chinas-fashion-landscape

To sum it up, the designers reflexive accounts suggest that designers built their narrative identity around claims related to cultural hybridity (i.e. fusion of contemporary and tradition; craftsmanship and modern technology, east and west aesthetics) rather than a contrastive perspective (i.e. the West versus Chinese/the East), which exemplifies the complexity and fragmentation of identity and breaks down the dichotomous thinking model of East and West.

Discussion

In offering fashion designers a chance to "speak" to us, their narratives challenge the essentialised view of Chinese fashion as a culturally and professional homogeneous group, which is represented by cultural symbols and defined by the negative connotation of "made in China" (e.g. Reinach 2005). They help the reader gain a basic understanding of the complexity and nuances of the identity formation of Chinese fashion whose characteristics cannot be captured in neat typologies.

In the present study, sustainability, the plurality of Chineseness and hybridity were evident in all of the designers' narratives, playing a key role in the construction of identity. It indicates the complexity and fluidity of culture, the hybridity and plurality of individual identity, and the interrelationship between individuals as agents and contextual factors. The identity of Chinese fashion, therefore is featured as nuanced, hybrid, plural, and sustainable.

Designers' "small narratives" not only problematise the either/or dichotomy of 'West' and 'East', but advocate that no collective identities come into being as object that can be eternally categorised.

They warn us of the risk of interpreting Chinese fashion against fixed, rigid or readily measurable attributes. It is more appropriate to perceive the conception of Chinese fashion identity, less a ascribed category with stereotyped labels, more as a process, a dynamic, fluid and ongoing process of construction.

Although this study is based on the narratives of fashion designers in China, its findings have clear implications for audiences both here and in a range of other destinations. Listening to the stories of the designers can help break through culture stereotypes, improve the cross-cultural understanding, and move towards a paradigm shift. Furthermore, designers' collective narratives effectively complicate any simplistic understanding of Chinese fashion identity purely in terms of East-West cultural binary.

Conclusion

This paper sets out to explore the conception of Chinese fashion identity through the analysis of the narratives of fashion designers. The theoretical underpinnings provided by Giddens' (1991) "reflexive project of the self" and the use of narrative methodology provide fresh insights which challenge and disrupt widespread understandings of Chinese fashion defined by the negative meaning of "made in China" and orientalist view of Chinesness. The resulting designers' narratives are defined by agency, reflexivity, hybridity, plurality, and sustainability, which reshape the global perception of Chinese fashion. By offering fashion designers a chance to "speak" to us we are better able to appreciate both the depths, nuances and complexities of Chinese fashion identity, and the implications for fashion educators, professionals in the fashion industry and beyond.

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Appendix 1: Details of source of the narratives

Fashion Designer	Sources of narratives
Qiu Hao	Published by Francesca Fearon in 2013. Available at: http://www.educationpost.com.hk/resources/art-design/131021- fashion-chinese-designers-lead-global-trends
Ma Ke	Telephone interviewed at home in Zhuhai, China by Eco Fashion World in 2008 Available at: http://www.ecofashionworld.com/Designer-Profile/Useless-Design-by-Ma-Ke.html http://www.designcatwalk.com/ma-ke-chinese-fashion- masterpieces/
Masha Ma	Published by Francesca Fearon in 2013. Available at: http://www.educationpost.com.hk/resources/art-design/131021- fashion-chinese-designers-lead-global-trends
Guo Pei	Interviewed by K. Hou in 2015. http://nymag.com/thecut/2015/04/chinese-couture-designer-releases-mac-collab.html
Yin Peng	Interviewed by Sarah LeTrent at CNN at China Fashion Week Beijing 2014: http://edition.cnn.com/2014/10/31/living/smog-mask-china- fashion-week/index.html
Uma Wang	Cherie Paris, Uma Wang Interview In Paris Fashion Week, April 23, 2012. Available at: http://streamingmuseum.org/when- chinese-fashion-designers-rule-the-world/
Laurance Xu	Interviewed by Gemma Williams in 2015 in her book Fashion China. London: Thames & Hudson.
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Fashion Rule Defied: Colourful, Contextualized, and Visually Compelling: Challenging the Mundane Notion of Uniforms.

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INTRODUCTION

In this paper as a case study, the notion challenged is that uniforms are standardized, decontextualized, and purely functional. Uniforms have never been "fashionable" in the dynamic sense of the word. Their prime virtue is their functionality, thus it is likely that they are seldom changed and appear visually monotonous. In India, uniforms for patrolling personnel, have remained unchanged since 1947 – which is when the British Raj ended and India embraced its independence. It is striking that the same uniforms left by the British are still used in India 70 years since, as though visually representing the bygone era of colonization and submission.

Today, with its growing economic prowess and reborn interest in its own tradition and personhood, India is showing an interest in representing its culture and stories in clothing – and according to the study, why not in the uniforms!

This paper, presents this phenomenon through a case study. The case study documents the conceptualization of a uniform for the Delhi Government. In this paper the methodology of the design process, and the final implementation will be outlined.

The Mohalla Rakshak Dal (MRD)

Delhi has been capturing global headlines regarding concerns about its women's safety. Primarily in response to this problem, the Delhi Government proposed a neighborhood-specific patrolling squad called the Mohalla Rakshak Dal (MRD). The MRD, separate from the local Delhi police, will strengthen "local neighborhood processing and strengthen women safety" (Economic Times, 2016). Pearl Academy received a proposal as an opportunity to design uniforms for the MRD.

The Challenge

The brief shared with Pearl Academy by the Delhi Government indicated that the uniform should strike a balance between funkiness and strength. It was to have a modern look and approach, generate positive associations for citizens, have an easy commando feel, and be complete with smart badges. Over all, the brief was to design an eye catching uniform with an accent of 'pink', given as the prime agenda of the MRD towards women's safety. The challenge was to design something that would fit these requirements, enhance the user experience of the citizens, and also be appealing to the wearers.

Conceptualization Stage I: Study

What is the uniform?

A uniform is a means of belonging and making people belong. Nothing quite sums up the power of "we" like a uniform, and nothing quite suppresses the potency of "I". Armies, police forces and militias led the way, but today uniforms are used by the new generation of service industries, from security guards to delivery firms. In a world where individualism is ostensibly encouraged, individuality is chaos for many of today's organizations. http://www.studymode.com/subjects/individualism-vs-collectivism-page1.html[accessed 19/12/16].The uniform brings big order. cathartic

Historical Review: Inheriting the Indian Police uniform

Presently, the Delhi Police wear the standard Indian Police uniform, which is a fresh remnant from a colonial past. The drawing up of the Indian Penal Code in 1860 and the Indian Police Act of 1861 marked the shift of power in India from the Mughals to the British http://www.academia.edu/2052242/Civilised_Coercion_Militarised_Law_and_Order_Security_i n_Colonial_South_Asia_and_the_Blue_in_Green_Global_Order [accessed on 20/12/16]. Both the law and its enforcers were British, and to this day, are based on India's colonial past. A classic example is the khaki colour of the Indian Police uniform.

In the mid-1800s, British soldiers in India began dyeing their white uniforms in a dusty colour, using anything from muddy water to tea to cutch as maintaining the colour white was difficult in a dusty subcontinent. This process created the colour khak, an Indian word for dust, earth, and ashes. In 1847, Sir Harry Burnett Lumsden brought in the first official khaki uniform (Times of India, 2007). The uniform, not just the colour khaki, are still in use today. For the uniform project, khaki would thus naturally be the safest choice. However, empowered by the brief, and by feedback on surveys (discussed later), the design team was encouraged to explore something different. This would in fact, turn out to be the first rule to break, as is discussed later: no khaki!

Figure 1 : The Indian Police Uniform in the colonial era. The current style of the Indian Police is very similar as shown later. 15th Punjab Regiment soldiers. (Source: Ancient Faces, 2015)

Silent Salesperson: Brand value

Apart from the functional value of recognition, the uniform also inspires associations in both the wearer and the onlooker. For the wearer, the uniform can create associations like belongingness and connection with the organization's purpose; for the onlooker, reliance and dependency. Understanding this associative aspect of uniforms, the team aimed to inspire the aforementioned associations.

The design must be engineered to reach this associative goal. In today's global culture of consumption, this would mean enhancing the user and deliverer experience. The uniform was a product that needed effective packaging for as Janes Pilditch (1961), put it, the packaging is in fact, the "silent salesperson" responsible for associative communication. In packaging, design, presentation of the logo, range of colours, quality and shape of the materials are elements that set the product apart and position it well in the eyes of consumer and in this case, the delivery personnel – the policing squad. The product needed a packaging – the uniform – that was easy to identify and appealing to both the wearer and the onlooker.

The realization, that consistent branding of 'identity' not only will help to increase viewer's loyalty but also add to the perceived value of the product that is getting designed. A strong belief, supported while survey validated the fact that packaging reinforces the iconic nature of the concept identity ,which helps create a cohesive look with lasting impression and quick recall value (Design Masters, 2016).

Stage II: Information Incorporation

Equipped with basic study, interactive techniques were used for collecting and implementing feedback from all the parties involved – the client (the government), the onlooker citizens, and the wearer patrolling personnel. The last two were crucial to the process. While the client issued the initial brief, the core of the project was inspired and developed with the citizens i.e. end product consumers and onlookers and the wearers i.e. the MRD, patrolling squad.

Epistemology and Methodology

For opinion-based and variable data that would be gathered in the feedback collection process, qualitative data was the most appropriate choice. It enabled team people, to get insights into people's personal beliefs, attitudes and experiences that can't be gauged from just using quantitative methods.

Sampling

Three sample sets were used with many variations to get as many viewpoints as possible and employed semi-structured interview as the main tool for data collection.

A. Police personnel: The Delhi Government nominated 10 constables for interviews with the design team. Four police guards were over 45 years old and six were younger. Seven were men and three were women. This was the sample that represented the wearers.
B. Slum citizens: 14 individuals comprising of six men and eight women residing in slums.
C. Urban citizens: 32 individuals comprising of 12 design students (eight girls and four boys) aged between 20 and 25, seven professionals (two women and five men) aged 40 years and above, three bureaucrats, six urban women, and four photographers.

Including variations in categories, gender and age in the sample sets, helped increasing the breadth of viewpoints that were gathered. Gender was crucial in such a study because of the mission of the MRD and the traditionally masculine perception of the police.

The constable sample (A) was crucial as the design was after all, to be worn by them. Feedback from the slums (B) was also important as the MRD will first patrol in these areas where crime rates against women are higher. For (C), the younger girls in particular factored in views of women who may be out at late hours due to lifestyle and professional commitments and become vulnerable to violence due to these timings.

Semi Structured Interviews and Questionnaires

Semi-structured interviews were used for sample A and B, following a set of standard questions but leaving the discussion mostly open for a wholesome perspective to generate more meaningful design outcomes. As wearers of the uniform, sample A was most directly affected by the design. It was important to know what they thought about the uniform in a wholesome manner. As slum inhabitants, sample B was most likely to feel comfortable in an informal interview. For sample C - the urbanites were most likely to follow a structured questionnaire. This seemed like an optimal division of the team's resources for data collection.

In order to get reliable data from respondents, the researcher should create a comfortable space. Initially, in this project informal discussions were strategised, that flowed naturally and built trust and rapport with the respondents, listening keenly to their responses. The limitations here are typical to interview style data collection – like room for dishonest responses – and questionnaires – like missing out on multilayered qualitative information. Another limitation could possibly be Researcher's situation in the narrative. As a female researcher, the designer was interviewing men and women in and about a predominantly masculine profession.

Findings

The questions in the questionnaire and the interviews for the urban and slum citizens asked about how they perceive the khaki color in the uniform, the associations they draw from the police uniform, how open they are to a change in uniform color, and lastly what color khaki could be replaced with if at all. These questions used the current Indian Police uniform as a reference point, which is used by personnel in Delhi.

From the urban sample, first and foremost, it was found that 84% said they could easily identify the police in the middle of the crowd, indicating the longevity of the uniform's use and people's socialization over time in recognizing the uniform. Notably, an overwhelming 58.1% thought the khaki color represented a strong identity of the Indian Police and should be continued. In fact, when asked what they liked the most about the current uniform, a significant 35.5% of the respondents said the khaki color. This shows the deep connection between the khaki color and the police uniform. Should the khaki spell be broken while proposing new design, which it is (as discussed later), it would be a huge diversion from the norm.Yet, it was also found that when asked about the feelings respondents had when they saw a policeman in a uniform, a majority 40% picked "Intimidated".

Additionally, when asked about what they would like the new force (the MRD) to wear with reference to the color palette, 62.1% picked blue and 13.8% picked black. This shows that even though khaki had strong associations with policing, people were still open to change.

Stage III: Ideation and Integration

During the stage of ideation inputs from the government were useful and the findings from samples surveyed helped start working on the concept design and consequently, feedback collection was a continuous process, although the initial gathering of information and perception as aforementioned was crucial in its own right.

Figure 2 Indian Police uniform today. It looks very similar to the uniform in Figure 1. (Source: Dailymail, 2012)

The patrolling squad and by extension the uniform are sensitive to a local problem. The designer thus approached the entire project diligently to achieve brand consistency for the local MRD and started to work primarily on packaging, logo keeping context in focus for this overall branding process. Although the primary focus of the ideation process was on contextualizing, Though, international uniform designs and global fashion trends weren't ignored.

For example, while studying international uniforms, visible placements of strong graphics was made note of (Figure 3) and team was open to integrating such elements in the final design,for a greater impact of graphical logos on the uniform, which was being proposed as a design element to help incorporate an attribute of approachable authority, inspiration from the 'varsity craze' and other fashion merchandise, where the graphic element was extremely powerful was taken.

Contextualizing Indian Mythos: Goddess Durga Commands

Goddess Durga is the Indian goddess of power, often depicted majestically riding her tiger. The tiger symbolizes unlimited power and since it is controlled by Durga, she is the possessor of unlimited power. She uses it to protect virtue and destroy evil. The tiger is also understood as a symbol of uncontrolled animalistic tendencies such as anger, arrogance, selfishness, greed, jealousy and desire to harm others. Goddess

Durga tames these tendencies and enforces justice. Goddess Durga, as a woman wielding so much power, is especially special to the MRD project given the focus of the MRD on women's safety.

Goddess Durga's multiple arms accentuate her power and ability. This element of supernatural ability empowers her to protect mortals. The logo on the sleeve was inspired by this multiple-arm attribute.

As can be seen from the final logo design, the overarching elements encase the inner M (mortal i.e. common citizen), protecting it as if it were Goddess Durga enclosing one with her arms herself (Figure 4).

Based on Indian faith, the emotion we intended to illicit is approachability and strength.

Figure 3: A collage showing different uniforms from all over the world.

Figure 4: All pictures have strong graphic appeal. The last logo is created based on trending elements. (Source: mountolympusawards.com, 2016)

Figure 5: Epitome of power, Goddess Durga (Source: 8tracks, 2014).

Figure 6: Multiple arms of Goddess Durga. (Source: Ananda Ayurveda, 2014).

Community Play

The main logo too had to project approachability, commitment towards duty, and responsibility towards society.

Inspired by multiple hand-holding individuals (Figure 5) representing community, the final logo design graphically placed cyclic patterns signifying care, protection, strength, support to community, depiction unity and power.

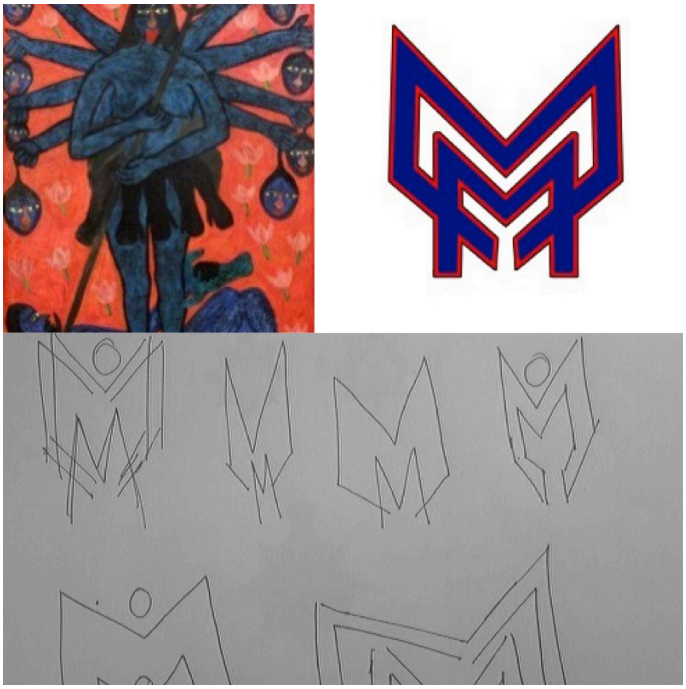

Figure 5 The final logo design inspired by Goddess Durga.

Figure 6 A community circle elicits emotions of unity and power.

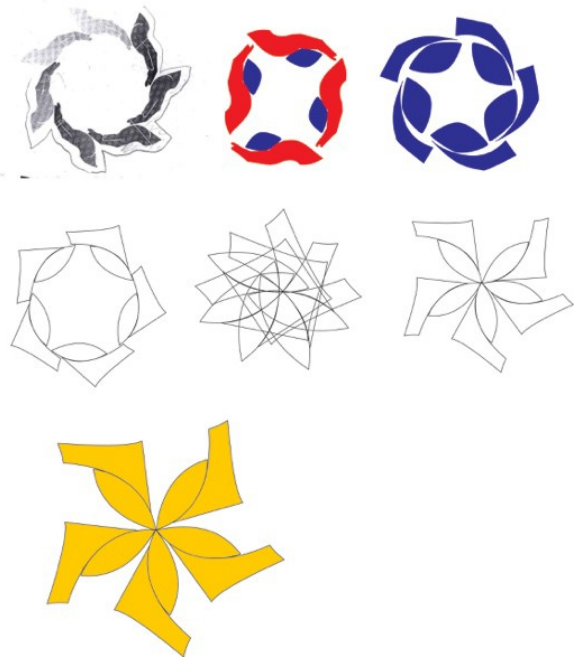

Figure 7 Progress towards the final design.

Figure 8: Final design in color.

Color Play: The Meanings Within

The client brief asked for a funky and strong design with a shade of pink. Given this appetite for change from the government as well as the openness to change showed by the surveys, a color palette was developed through trial and error ranging from the most conservative color (khaki) to more experimental ones. From the questionnaires for the urban sample and interviews with the constables, it was gauged that dark blue was a popular choice. Pink, on the other hand, was a requirement in the brief. Color stories were developed, although the dark blue and pink combination emerged the final winner.

Why Blue?

Blue was a popular alternative to khaki in the samples we studied. On further study, in color psychology, blue is associated with an approachable, reliable, and formal feel. Blue interacts with human minds and attitudes in all situations, especially situations within the commercialized, corporatized, and advertisement-saturated culture. In short, blue builds visual and emotional recognition.

Figure 9 Blue is formal and approachable (Source: Huffin-

Figure 10 Commonly seen: logos in blue (Source: fatrabbit CREATIVE, 2016)

It's no surprise that lots of companies like General Electric, Ford, Walmart, The Weather Channel, Gap, American Express, AT&T all use blue in their logos. Most likely they found blue to be the best look for their company to communicate ideals of trust, reliability, productivity, and intellect https://www.fatrabbitcreative.com/blog/psychology-of-the-color-blue-and-what-it means-for-your-business [accessed on 20/12/16].

One last association is that blue commonly has an association with justice, loyalty, and perseverance, precision and intellect, designed to suggest security, stability, cleanliness, safety, and peace (fat rabbit CREATIVE, 2016). Steering the discussion back to contextualization, indigo blue was picked as the final choice given the historical link of the color with Indian royalties.

Why Fuchsia?

While a shade of pink was requested by the government, as preferred accent. First, something identifiable enough was needed to stand out from the indigo blue. Second, the color needed to embody a contextual meaning. Both these elements were found in fuchsia, a rather bold choice for India's shade of pink.

Fuchsia depicts quirkiness and is eye catchy. It not only fits in well with the color on Indian streets, as after all, Diana Vreeland stated "Pink is the navy blue of India", but it also carries some associative, contextual elements with the Gulabi Gang, a gang of women who fight (sometimes violently) for the rights of India's beleaguered women (The Diplomat, 2015). The gang wears a distinctive uniform that now everyone recognizes – a sari with a special color: fuchsia. The gang is associated with notions of justice for women, which is also the goal of the MRD.

Figure 11 Street art for violence against women combining both elements of Goddess Durga and fuchsia (Source: The Diplomat, 2015).

Figure 12 Gulabi Gang (Source: buddygambol.com, 2015)

Interaction: Using Indian Pop Culture to Reach Out to the Wearers

A large part of the process was collecting feedback and interacting with the sample sets continuously, various methods were employed , for example, making design students interact with the constables to make them comfortable with the idea of wearing fuchsia. A key exercise was using popular culture to reach out to the wearers (the constable sample) as the associations wearers draw from the uniform were also important to the project.

A young, approachable, and funky perspective was incorporated in the conceptualization inspired from pop culture, namely Bollywood. Funky looking police personnel have risen in Indian pop culture consciousness with the release of popular Indian films,

Figure 13: Bollywood star, Salman Khan, glorifies cop-style in his movie, Dabangg. 10 (Source: mtvstat.in.com, 2010)

like Dabangg and Singham, which glorifies police personnel. While pop culture in India has always greatly influenced fashion, this effect is augmented by social media and e-commerce that informs youngsters about fashion trends even before films are released and connects them to suppliers of merchandise instantaneously.

Pop culture appeal was used to reach out to the constable sample while presenting the designs. For example, the following band styles and colors were presented to the constables and they were asked for prference. The one on the left symbolized Salman Khan's shocking and electric appeal in Dabangg, while the one of the right symbolized the intense charisma of Ajay Devgn in Singham. The constable sample was asked if they wanted Salman or Ajay. They picked the latter. The exercise encouraged associations of pride and savviness in the constables, as the uniform made a direct link with pop culture icons.

Final Design Developments

Figure 14 Dabangg style on the left and Singham style on the right.

The Story Board

Final Shoot

Reception and Project Status

When the final product was brought to real space testing in the slums, the women in the slums responded positively to final visual outcome as indicated in our interviews. They felt they could approach the the patrolling squad clad in the new uniform without any hesitation, as the new blue looked approachable and friendly in comparison to the khaki that instilled fear. Government officials also welcomed the color story sensing the design process was attentive to connect the uniform with masses. The design was inclusive of

many viewpoints and met the demands of the initial brief: sturdiness, approachability, woven with a touch of funky. Currently, the final launch of the MRD is in the pipeline.

Conclusion

The case study presents an active process of contextualization. Information and active feedback was incorporated from interviewing as many local agents as possible. The design elements that were played with, such as color combination, mythological and pop culture inspiration were context specific to the purpose of the MRD. The overhaul in the color combination from khaki to a combination of indigo blue and fuchsia was a key challenge to the norm.

Not only did the masses have a long-term association of the police with khaki color, even the police themselves felt this way. For example, in an initial briefing, a government official said that khaki color was the best option as it is well-suited to India's climatic conditions. The khaki afforded an economic advantage in the pre-independence era where an easily washable and non- iron color and fabric like the khaki was preferred. The team's study challenged these notions of long term associations with the khaki color, and even its frugality, as they contextualized the uniform attending to demands of the brief, the citizens and the wearers themselves in newly industrializing India.

Challenge was to break the rules while designing something as rule-bent as the uniform itself. Equipped with survey data, interview responses, the brief, and contextual inspiration, a new color palette was explored, a fresh, contemporary appeal while retaining the intensity of historical influences using mythology, and ended up with the result that the wearer and the onlooker citizen experience aesthetical cultural feel with functional value and associative emotions like pride for the wearer and confidence for the citizen.

The Bigger Picture

As common design practice in India, the uniform design has always remained a decontextualized subject. This project indeed challenged that, but this experiment is in line with a global move towards contextualized imagery and design also. For example, the Rio'16 design displays an insightful play of Rio's natural beauty and color, the main inspiration being the Sugarloaf Mountain.

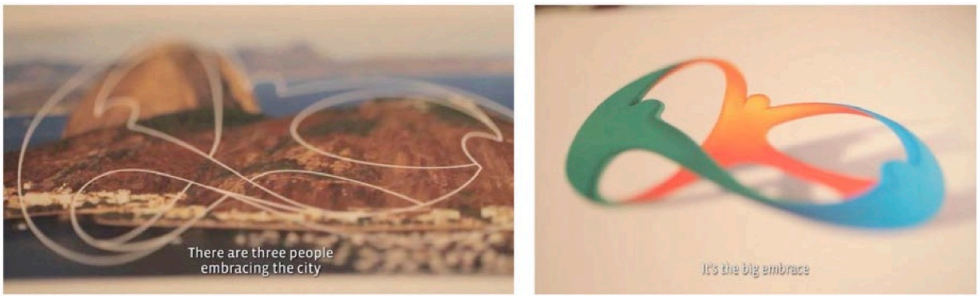

Figure 15: Rio'16 logo is contextual. (Source: The Logo Smith, 2016)

A similar strategy was used for our uniform design, incorporating a modern and visual narrative woven with elements from pop culture and mythology, thereby contextualizing the design outcome, balancing a stylish, cult feel with discipline and approachability and breaking the rule that uniforms are mundane, unchanging and decontextualized. The Rio example illustrates that this rule is not broken in isolation as there is a push in other parts of the world to challenge fashion rules as well. This specific case study can help make sense of other contextual design movements that are taking shape globally.

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Changing Mindset in the Handloom Weaving Cluster in Varanasi: From Child Labour To Child Centric

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KEYWORDS

Fashion Activism, Indian traditions, Zero Child Labour compliance, ethical practices Corporate Social responsibility.

ABSTRACT

Many companies who are sourcing from India are ensuring that the products, which they are sourcing from this country, are complying with ethical work practices in all stages of production. These compliances refer to how a business follows Sustainable Human Capital Advancement through better social practices for its employees and the environment at large.

For many years, in India, children were involved in producing Textile Fashion products, particularly in the Varanasi belt like silk brocade fabrics and carpets. Traditionally, it was taken for granted that children would be engaged in helping their parents in ***Carpet weaving and Banarasi Brocade*** weaving using ***Jala looms***. While the children helped in processes like the preparation of yarn, warping, and simple weaving, they automatically learned the traditional brocade weaving techniques and hand knotting techniques for carpet weaving. It was considered as a kind of Vocational Education carried on from **'father to son'.** However with the increase in consumption and demand from the export market, the age-old tradition of learning to weave from father to son, unknowingly lead to a situation where the children, instead of just helping the parents, were forced to work for many more hours at the looms and were denied the freedom of childhood. Sometimes the places where the children were weaving were not even properly ventilated or lit. The Children were denied a normal childhood, to play, enjoy and grow freely. ***Children were not given the opportunity to develop their minds and personality or to choose any other profession other than to follow their fathers' footsteps.*** The tradition of learning a skill from father to son, unfortunately, turned into an unethical practice to the extent that it took an ugly form of child labour almost amounting to child abuse.

Introduction

Fashion and Beauty are two sides of a coin. However, if one goes deep into the concept one realises that there often is an ugly history behind the Beauty. This ugliness is paradoxically embedded in the cultural ethos of a region in which the fashion product is manufactured.

The fashion products in this paper are the exquisitely woven carpets and the Banarasi Brocade sarees in the handloom cluster of Varanasi. Earlier, weaving skill and related processes like dyeing and warping were passed down from father-to-son in the traditional 'Guru-Shishya- Parampara' style of education. Gradually, socio-cultural pressures, industrialization, keen competition, increased demand for export, pressurized weavers to not only use their children but employ other children from the village below the age of fourteen.

These children were employed on meager wages and forced to work for long hours under unhealthy conditions, in ill-lit, ill-ventilated small sheds, depriving them of their childhood freedom to play, laugh, enjoy, study and grow. Thus the tradition of learning a professional skill from father-to-son, unfortunately, deteriorated into an unethical practice of child labour.

This paper focuses on the social change, which has broken the mindset. It highlights the ways in which the Government of India and the UNICEF have made it mandatory for manufacturers, weavers and exporters to comply with the International Standards regarding the prohibition of child/forced labour and gender discrimination, healthy working environment, adequate wages and working hours in order to eradicate child labour and develop systems for its sustainability.

The Beginning

'Guru-Shishya-Parampara' is the teacher-disciple tradition in the Cultural heritage of India. In *Sanskrit,* ***Guru*** *is a teacher,* ***shishya*** *is student and* ***parampara***m means *an uninterrupted succession or lineage*. It is the lineage of passing knowledge from gurus to a student. Thus, knowledge was passed from one generation to another. Handloom weaving, carpet weaving and knotting were skills learned through *Guru Shishya-Parampara*. Traditionally, children were engaged involuntarily in helping their parents in carpet weaving and Banarasi brocade weaving. While the children helped in some processes they automatically learned the traditional techniques, considered as a kind of training carried on from 'father to son'. However, with the increase in industrialization, the tradition took an ugly form of 'Child abuse or Child labour' and children were denied the freedom of childhood.

> ***Child labour*** *involves at least one of these characteristics: Violates a nation's minimum age laws; Threatens children's physical, mental, or emotional well-being; Involves intolerable abuse, such as child slavery, child trafficking, debt bondage, forced labor, or illicit activities; Prevents children from going to school and uses children to undermine labor standards.* ***'Child labour'*** *is normally concentrated in the informal economy, in the rural sector and in other industries hidden from public view. (Nippierd, Louis and Vandenberg, 2007)*

The tradition of using handlooms to weave fabric is an intrinsic part of the cultural history and ethos of India. In the year 2013-14, the Handloom sector in our country produced approximately 7116 million square meters of fabric. 15% of textiles produced in India are hand woven, by weavers using traditional handlooms. ***It is interesting to note that 95% of the world's handloom fabric is made in India.*** (Prayas, 2016)

The weaver community all over India practiced this profession in a unique way. They learned all the processes involved in weaving from their fathers and forefathers. There were no schools or formal vocational courses which the children of weavers could attend in order to master the skills and processes involved in weaving, right from understanding the functions and importance of each part of the handloom, to warping techniques, to weaving and finally finishing.

There was no school that taught the art and design involved, the colour combinations and then the technique to translate the paper design into a fabric or carpet. The only way handloom weaving survived was because every weaver taught his children how to weave and this tradition of informal professional education continued to contribute to the richness and uniqueness of the Indian handloom fabrics and carpets. It was considered a matter of great pride for a father to pass on his weaving legacy to the next generation and so forth. Weaving to a weaver in the pre-independence and early post-independence days was nearly meditative in nature; it brought happiness, emotional satisfaction and a sense of pride. However, with Industrialisation

and a growth in the export market, the weaver began to face huge pressures of competition. To survive this, they began to think of ways to increase their production. Other Children from their village and nearby villages began to be 'employed'. They were made to work and earn. The conditions under which these young weavers worked were poor, with the spaces being il-ventilated and badly-lit sheds. They were often forced to work for long hours and faced emotional abuse too. Gradually the beautiful age-old legacy of handloom weaving took an ugly form, leading to the problem of 'Child Labour.'

The causes of child labour in the handloom weaving sectors

'Child labour' can be categorized as work done by children below the legal work age of a nation, which threatens their physical, mental and emotional health. Child labour is normally concentrated in the informal economy in the rural sector & in industries hidden from public view. *Children who are engaged in child labour either because they are below the legal work age or because they work in hazardous, illegal or degrading conditions are unable to develop to their full potential* (Nippierd, Louis and Vandenberg, 2007)

The Economists, Sociologists, Policy Analysts and Anthropologists have identified different reasons for the existence of child labour. Children may have worked for many years earlier, but industrialization changed this practice to a social and economic evil. Economists relate this problem to poverty. Sociologists and anthropologists feel that Child labour is caused by multiple factors like age old traditional customs and thought process, to attitudes, to lack of schools in the vicinity and perhaps social discrimination caused by rigid casteism, gender preferences or cultural exclusion.

Prohibition of child labour

> *Dixit states, 'child labour can be partly due to sheer poverty, partly due to unresponsiveness of the schooling system on offer, partly due to social discrimination (on caste and gender grounds) and partly due to cultural exclusion (Dixit, P. 2004)*

Simply laying off children is not an appropriate solution; instead, enterprises can work with other groups to assist in the transfer of children to school and ensure that the welfare of the family is not damaged by the loss of a child's income. (Nippierd, Louis and Vandenberg, 2007)

For the last fifteen years, there has been a growing concern about this problem within and outside India (Venkateswarlu, Ramakrishna, and MOID, 2006). The Government, NGOs, industry, and International agencies like the International Labour Organization & United Nation have taken many initiatives. Under the **Child Labour prohibition and regulation Act of 1986,** the Indian government has prohibited employment of children in certain occupation and processes**.** A study published by **Carpet Export Promotion Council** in 1998 claims that child labour accounts for only less than one percent of the total workforce in the carpet industry. *The ILO-CORT study done on 240 weavers estimates that the proportion of child labour to the total workforce is 22% and the present study estimates it as 7.13%.* (Venkateswarlu, Ramakrishna, and MOID, 2006).

In addition to enacting this law the Government of India, following a Supreme Court directive in 1996, launched a special scheme (National Child Labour Project) to wean children away from such hazardous occupations and processes and to rehabilitate them in special schools meant for children of the weaver community. As per the study commissioned by **International Labour rights fund** (Venkateswarlu, Ramakrishna, and MOID, 2006) a number of International agencies launched special projects to assist the local NGOs.

The **Child Labour Prohibition and Regulation**, the amendment in July 2016 (Ministry of Labour and Employment, 2016), states complete prohibition of employment of children below the age of 14 but at the

same time allowing minors to work in the family enterprise. Now children younger than 14 years can work in family enterprises and firms after school hours and during holidays. According to the 2001 census, there were 12.6 million child workers between the ages 5 to 14 years but as per the 2011 census, the number fell to 4.35 million.

Child Labour Abolition Act is a step in the right direction and needs to be followed by proper implementation and enforcement of the Act. *The legislation must be backed by tackling the root causes of child labour, i.e., illiteracy, poverty and food insecurity, social exclusion, discrimination, and exploitation*. (ILO, 2012). Awareness of the issues, with proper training and capacity building of the enforcement agencies, collective action with the civil society organizations particularly the NGOs will create the necessary environment for the enforcement of the Abolition Act.

Methodology Adopted For The Study

The focus has been to present the cases relevant to ***adopting the ethical ways of working*** while preserving the ***father to son*** phenomenon: *a continuous learning and providing a better life to weavers and their family members including children.* Research states that companies are forced to follow "Child Labour Laws" not only from the Indian Government but also strict guidelines and directions from the buyers. Consequently, the people involved in this trade seek new ways of improving weavers the conditions and environment of the weavers and their families. This study was mainly based on data collected from field interviews and discussions with manufacturers, exporters, NGO's and social activists. The tools used for primary data collection were semi-structured interviews and case studies. Two case studies from two different areas were taken to understand the social changes that helped in reducing child labour amongst the weavers in a carpet sector and a *saree*-weaving sector. The first case study is a carpet company engaged in improving the environment of the weavers and their families by implementing regulations and systems. The second case study is a weaver from the Banaras weaving community engaged in weaving traditional Brocade *sarees* from the last five generation on the traditional **Jala loom**.

Case Study I : Obeetee Pvt. Ltd.

Obeetee Private Limited, established in 1920 and incorporated in 1932, are one of the largest manufacturers and exporters of fine hand knotted, hand tufted carpets and other floor coverings. Obeetee is Government of India recognized 'Trading House' and has received several awards from the Government of India for exceptional export performance.

It has about 700 company employees and about 600 contractors' employees. About 15000 artisans are involved in weaving and other manufacturing processes of carpets. The Company has modern dyeing facilities. The Company has a Wholly Owned Subsidiary in the U.S., Obeetee Inc, with its showroom in New York. A substantial part of its sales is in North America. It also has Wholly Owned Subsidiary, Obeetee Textiles Pvt. Ltd, which manufactures and distributes non-woven floor coverings in India.

ACTION TAKEN TO ENSURE CHILD LABOUR FREE PRODUCTION AT OBEETTE PVT. LTD.

Before explaining the systems for ensuring that their carpets are free of child labour, it is necessary to briefly describe the process of carpet manufacturing. Carpets are mostly produced in India, particularly in Mirzapur-Bhadohi carpet belt where Obeetee is located. Carpets are not woven in factories. These are woven mainly in the **villages** spread over a huge geographical area estimated to be one hundred thousand square kilometers, in several districts of the state of Uttar Pradesh and in some districts of neighboring states. The actual weaving of carpets is done in the premises of independent entrepreneurs who are either loom owners or small manufacturers, sometimes called Supporting Manufacturers, who engage their own weavers.

The exporter usually issues the raw material and design to the loom owner or supporting manufacturer. Alternatively, an exporter issues the raw material and design to a contractor who gets the carpets woven through his own loom owners. In yet another system a contractor or loom owner uses his own raw materials for executing the order of an exporter and then sells the carpet to the exporter.

Obeetee carpets are currently made on more than 6000 looms located in several hundred villages. They have their own depots located in the carpet weaving areas. Company executives manage the depots. Other employees of the Company assist them and inspectors directly interact with loom owners and supporting manufacturers. ***Mr. Abhinay Gupta, Vice President, Obeetee*** informed that Obeetee has its own in-house manufacturing unit and also works with supporting manufacturers. He also informed that this decision of not using Child Labour was not easy to implement due to circumstances and systems as described earlier in which carpets were being produced in India. However, the Company firmly resolved to go ahead and implement a strong system that ensured that the carpets were actually 'child-labour free'.

Shri. Indra Bali Singh, Senior Vice President (Factory Administration) also shared information about the remedial steps taken to make sure that child labour was not used in their unit as well as by supporting manufacturers. A major campaign was launched in the villages amongst loom owners and weavers, for creating awareness about the social and legal implications of the use of Child Labour. Written assurances were obtained from the loom owners that they will not employ children below the age of eighteen. If a loom owner was found engaging children below the age of eighteen on wages in the weaving of their carpets, then the Company would blacklist that loom owner and he would not ever be allowed to weave carpets for Obeetee. Weaving wages were increased significantly overnight as an incentive to loom owners to continue to weave Obeetee carpets without employing children and thus foregoing the income earned by the children.

A detailed and comprehensive system for monitoring of looms was set up. Obeetee engages more than 70 Inspectors for monitoring its looms for both quality of production as well as to ensure that no child labour is involved. The loom inspectors inspect each loom under a Depot, at least once in 3 days for all Tufted Carpets and once in 15 days for all Knotted Carpets, and report their findings to the Executive In-charge of the Depot. The depot executives give a monthly certificate to the management that no children are illegally employed in the weaving of Carpets for Obeetee. A large computer database (names, ages, addresses, and photographs) has been created to ensure that all looms are systematically monitored.

A Child Labour/Social Accountability Cell was created, constituting of 12 Executives of the Company, to make surprise inspections on the looms. The executives of the Child Labour/Social Accountability Cell make surprise inspections on each and every loom once in 60 days for hand knotted carpets and once in 30 days for hand tufted carpets and others. They also have the facility in the factory to track the movement of all inspectors through a Global Positioning System. Each Obeetee carpet bears a Unique Identity Number allocated to it at the time the order is received and before it goes into production. This number helps the executive, in- charge to electronically track every possible detail at each stage of the carpet weaving.

The company has diligently implemented the above system. Within a short period of time after the initial implementation of the system, they started to achieve the desired results. During the last several years they have not found a single case of illegal child labour working on their looms.

Obeetee is SA8000 certified

Compliance with the law of the land is one of the core principles of the management. It follows good manufacturing practices and in pursuance of its policy Obeetee voluntarily obtained SA8000 (Social Accountability) certification in the year 2004, and continues with the same till date. The company accords all social security benefits to its employees. This standard includes prevention and use of child labour, bonded labour and control on all its suppliers with regard to Social Compliance. The company does these through six monthly surveillance audits for continued compliance with all the requirements of the International Standards.

Company social responsibilities activities

Education: a road to eradicate Child Labour

Education has both prevention and curative aspects in relation to the eradication of child labour. Child labour cannot be abolished unless all children are in schools, and the right to education cannot be realized in its fullest sense till children are actually attending the school. Education empowers children not only by providing them literacy but also knowledge of their rights and duties.

Obeetee through their intervention supports such schools, which are providing education to marginalized categories as part of their rehabilitation process. **"Project Mala"** is one of the most renowned and genuine NGOs operating in the carpet industry for past about 26 years. Right since the Project's inception in India, the Obeetee has contributed substantially to Project Mala for children's education.

Photo: School Children during the Morning Prayer.

The company makes substantial contributions to children's free education with mid-day meals, uniforms, and health care etc. Through Project Mala, children of weaver's community, and of underprivileged villagers from remote villages have access to a brighter future.

PRATHAM is another renowned NGO, which makes its interventions in the village primary schools and the community at grass root level. Obeetee engaged Pratham in the year 2015-16 for working in 30 villages surrounding its factory and the team worked with 30 schools, impacting the lives of 3500 children. As said in a letter by ***Devyani Pershad, Pratham's Programme Manager,*** *'Over the course of the camp, substantial gains in learning level were achieved. Children in the standard 3-5 groups dramatically improved in reading levels and similar improvements were observed in arithmetic as well. From this great achievement, the kids were noticed as having more interest towards their studies which will be a great help for their future studies and schooling.'* Pratham has also been engaged in the year 2016-17 and is currently working in about 25 schools in the concerned communities.

Insight

Review National laws regarding Child labour: The Child Labour Prohibition and Regulation amendment in July 2016, permitted children of weavers below 14 years of age to be trained by their fathers within the spare time after school. This is in sync with the traditional of learning skills and expertise from ***father-to-son*** in the true spirit of ***Guru- Shishya-Parampara***. Obeetee ensures that weavers train their own children and no one else's which is in tune with the law amendment of 2016.

Check the age of your employees: Obeetee follows a systematized data of each employee regarding age by acquiring their birth certificates. For those who do not possess a birth certificate, a medical examination prior to employment is done which includes an x-ray of the jaws/teeth, which gives a clear indication of age. These practices ensure that the employee is complying with laws against child labour.

Stop employing Children below the minimum age: Obeetee follows a stringent system of not employing children below the age of eighteen in their own manufacturing units and not below sixteen for supporting manufacturer. Through a workplace risk assessment, Obeetee has controlled the identified risk.

Child labour Eradication: Obeetee Pvt. Ltd was able to eradicate Child labor because their focus approached was clear and they continue to follow all the checkpoints according to ILO for completely eliminating and preventing child labour.

Photo: Naseem showing his creation

Case study II: beautiful banaras weaves

The second case study is of a Master weaver **Naseem Ahmed**, **a National award winner** for the year 2008, whose family has been weaving ***Banaras brocade sarees*** for the last five generations. Naseem, Master craftsmen was born in a well-known family of traditional weavers, where the art had been passed down from father to son. Naseem Ahmed's great grandfather ***Ali Hasan urf Kalloo Hafiz*** sahib at the age of 13, learned the art of weaving Banaras brocade on a Jala loom under the guidance of his father ***Wali Mohammed*** and the setting up of Jala from ***Usttad Mohammad Fatul***. His great grandfather ***Ali Hasan urf Kalloo Hafiz*** received the **National Award in 1965 and Padmashree award in 1974**. His grandfather ***Mohammed Jaffer Ali*** won the National award in 1972 and is an excellent brocade weaver. His father ***Moahammad Azizul Haque*** won the National Award in 2013. The awards received by his family in the last five generations are the pride of his family. (Ahmed, 2016)

The art of weaving with the Jala, as practiced in Banaras, traces its beginnings to the tradition of hand weaving, in Bukhara in Uzbekistan, seven hundred years ago. It is believed that Khwaja Bahauddin Bukhari, a revered saint from Bukhara, brought the craft to India. Their forefathers practiced the art in Gujarat and then moved to Banaras about 300 years ago.

The art of weaving Banaras brocades stands out for the use of the Jala, a mechanism for lifting warp yarns for weaving patterns. The patterns are first worked on paper and then the weaver creates it on a Jala a framework of cotton threads. This masterpiece is called the Jala and guides the weaver in weaving the most beautiful and complex designs. In a way, almost any motif or pattern can be woven with the use of the Jala. Making the Jala requires a lot of skill and experience, and members of Naseem Ahmed's family are accomplished in making Jalas of very complex patterns. His grandfather said hand weaving with the Jala is the pride and heritage of Banaras and that it was their duty to learn the intricacies of making a Jala and setting a Jala loom.

According to **Naseem Ahmed**, two years are required to learn ***Banaras weaving*** and five years for mastering the art of ***Jala making***. His forefathers taught the skills of weaving and other techniques to children of his family and also to ten to twelve children from other families in their village. During such sessions, they not only learned the technique of weaving but also got exposed to other weaving processes like yarn, dying, preparing a loom for weaving a brocade saree. Among students, some attended school in the morning and learned to weave in the evening, while some older children learned to weave throughout the day and went to school in the evening.

Naseem Ahmed attended school until the sixth grade but had to give up his studies due to financial issues. He used to attend many textiles exhibitions in Delhi and other cities with his grandfather, as his assistant, and give demonstrations about the Jala loom weaving along with his grandfather. These visits also gave him a good market exposure. His grandfather made great efforts to train him in every sphere of this traditional business. In this way, his grandfather was able to pass on all relevant expertise to the younger generation in the true spirit of the Guru- Shishya- Parampara and also develop contact to sell and learn marketing strategy.

Naseem Ahmed has four children. His eldest son is 13 years old but does not want to be a weaver. He has different plans for himself. Naseem Ahmed plans to start teaching him the weaving technique only after he completes his Higher Secondary education. Naseem Ahmed continues to weave Banaras Brocade sarees using the traditional Jala loom. Even today his sarees and Brocades are masterpieces and a reflection of the past glory of India. He believes in his roots, and therefore, every Brocade he weaves is a piece of art. He sells his Brocades at high prices only to people and collectors who value his expertise and the pure material he uses. He has, therefore, been able to take care of the financial needs of his family. He has his own workshop with twenty pit looms and a team of weavers. Young weavers are trained and employed by him. His father hopes that future generations will continue the tradition of weaving with Jala looms and not shift to power looms. He says that, in our race for development, '*we should not forget our centuries-old beautiful and unique traditions and heritage*'.

Insight

Change the traditional mindset: Children are not a source of income for the family but a crucible of the family's legacy. It is with this understanding that Naseem gives his children a choice in building their own futures.

Learning a trade is not age-specific: Naseem Ahmed learned the tricks of his family's trade when he was a young boy. Through constant interactions and experiences with his forefathers, Naseem learned the fine art of weaving, marketing, and carrying his family handloom legacy into the future. He chose to weave from a young age and understood that the handloom legacy was not just a family 'business' but also an attitude and an expertise that his family had perfected over centuries.

Education is how we learn, not what we learn: As seen in Naseem Ahmed case study, he had to leave his studies due to financial constraints, and yet was able to become a successful weaver and businessman with buyers and collectors approaching him for his work. In Naseem case, it is evident that the persistence with which one pursues one's passion and hones one's skill is as much an education (with family and 'Gurus' as teachers) as what his children will get in schools.

Exclusivity pays: Naseem did not compromise on the quality of the textiles he wove despite the sector around him undergoing tremendous changes with the power sector gaining ground. By continuing his family's handloom heritage of weaving on the intricate Jala loom, Naseem's products are now exclusive. His outlook tells us that exclusivity cannot be merged with price.

Societal changes need to complement Judicial reforms: Case studies like Naseem Ahmed's tell us that along with a movement on an executive and judicial level, a deep societal change is occurring where handloom weavers are teaching their children to weave as a life skill that extends beyond earning a livelihood.

Conclusion

The study and research conducted led to the deeper understanding that in the last three decades a lot of work has been put in by companies, manufacturers and stakeholders like the government, NGOs, carpet industry, and International agencies to bring awareness and understanding of the intensity of the problem of child labour and enforcement of child labour laws. Through all these efforts, the weavers and the manu-

facturers in the Varanasi belt realized that eradication of child labour is of primary importance for their business to flourish. The manufacturers, in order to eradicate child labour followed the guidelines listed in the International Labour Organization and Indian Labour law. Sustainable systems were developed so that they could be maintained and ill practices were eradicated. Exporters and weavers can be proud of the fact that they now have ***zero tolerance for child labour***.

Today, in the Varanasi belt there is a healthy, balance of the International labour standards of work, on the one hand, and, on the other, weavers are training their children to acquire the traditional craftsmanship and skill which have been passed on to them by their forefathers. The best part of the present condition is that children of the weavers' community are getting the knowledge and skill passed from father-to-son in their spare time, after coming back from school. Schools are giving them a holistic education and also vocational training which helps them in acquiring skill, knowledge, and attitudes needed to get a professional edge. Such initiatives are contributing to the reduction of poverty as well as ensuring the social and economic inclusion of marginalized communities and increasing the country's economic growth. The children of the weaver's community, today, have an option of choosing to follow their father's legacy or some other profession or go in for higher studies to achieve their goals.

Weavers get their due respect and value. Ill-practices have been eradicated. Sustainable systems have been developed. All this has ensured that the legacy of weaving exquisite carpets and Brocades does not die a slow death – instead, it flourishes and grows.

A mindset has been broken!

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The Delights of Difference

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Aberrant Celebration Challenge Diverse Difference

ABSTRACT

It is fascinating to wander through the streets, towns and cities across the world as an observer and spot those people who have continuously lived with a particular unique style to determine who they are within culture and society. Often far removed from contemporary fashion practice, bodies are adorned with clothing that can be understood to relate to a style of a particular historical epoch, or conversely, clothes are thrown together to weather the elements, worn for utilitarian purpose, or to reflect the cultural journeys of migration, amongst an array of other things. This visible bricolage, where clothes operate within space, yet reflect a variety of diverse cultural experiences can be seen to operate as living and physical forms of public art, with designers inspired in a number of ways, and, "... used fashion as a means of questioning societal rules and boundaries. Margiela, "... took clothes apart and reconstituted them in ways that challenged preconceptions about how we should dress." Cartner - Morely (2016)

Laurie, (1981) talks about the language of clothes operating as grammatical statements, sentences, paragraphs, or exclamation marks whereby a fashion statement adorned and embodied by individuals, can make a statement/s of who they are within different sites and locations at particular historical and cultural moments. Stuart (1984) acknowledges long and short term nostalgia and the way something past can operate as a form of contemporary language within the present and also the future, which is particularly visible through fashion resistance. Barthes (1980) labelled that element that visually disturbs or 'pricks' the viewer, as the Punctum. Therefore, the intention is to make explicit, the way those who do fashion in their local unassuming way, can be understood as a living form of disruptive media, with the body operating as both site and location to assist in realigning the way the fashion cycle operates. Those unique individuals who make literal marks on the cultural spaces they occupy by doing fashion in their own aberrant unique way.

Documented by artists and street photographers historically, these individuals refute the interpolative 'call and response' of fashion discourse, and ironically become unique fashion statements in their own rite. An example is 'Brother Sharp', living on the streets of Ningbo, who through a form of resistance to social norms became a catalyst for designers and their respective collections. Moreover, the ability to shape fashion practice by not following cultural codes can be understood as "a pure recording of something that is happening around us: a strong affirmation of freedom, beyond cataloguing and labelling". Cartner – Morely (2016) Therefore, the abstract's underlying purpose seeks to, acknowledge, celebrate, and pay a visual and textual homage to the delights of difference.

Introduction

Interestingly, and at times ironically, fashion designers, brand researchers, and other fashion cultural intermediaries find inspiration in people who do not actively appear to engage within commercial fashion

systems. Designers enjoy the cut and paste actions and manifestations of their influences within culture, and these acts of juxtaposition can change the way people think about fashion. Early work from Margiela was unique and unorthodox in the approach to traditional practice. The design team often '... took clothes apart and reconstituted them in ways that challenged preconceptions about how we should dress' Cartner-Morely (2016). For some, this was fashion design practice breaking with convention and paved the way to consider fashion from different perspectives that did not align to fashion norms. Not all forms of activism are consciously confrontational and the aim here is to acknowledge and celebrate other forms of subjective action that can also be understood to break with established cultural and social convention.

Some individuals do not seek out and appropriate the latest trends, yet are often used as the inspiration to set trends, and in turn, - and unbeknown to them, - become trendsetters. Bodies (Blackman, 2008) and subjectivities are shaped through interactions and entanglements (Barad, 2007) with both the social and cultural. And, as living forms of active matter, bodies through the association with another, human or non-human, can alter how an individual or collective group makes sense of the environment in which they operate. New materialism (Hickey-Moody and Page 2016) and the notion of the poetic (Bachelard 1994, Barthes, 1980) are used as theoretical approaches to understand how through selective choices and actions individuals, bodies, and things can manifest, coexist, become entangled, and reverberate in culture as forms of resistance.

The personal narratives underpinning style are numerous. Often far removed from contemporary fashion practice, bodies are adorned and can be understood to relate to a style of a particular historical epoch. Or, conversely, clothes are thrown together to weather the elements, worn for utilitarian purpose, or to reflect the cultural journeys of migration, amongst an array of other things. This visible bricolage, where clothes and things operate within space, yet reflect a variety of diverse cultural experiences can be seen to materialise as resistant bodies, and living forms of public art. Designers and consumers either consciously or unconsciously, "... use fashion as a means of questioning societal rules and boundaries (Cartner-Morley, 2016). Operating within fashion's discursive systems, power, therefore, can be both instrument and an effect of other forms of external power relations. It can also operate as a 'hindrance, a stumbling block, a point of resistance and a starting point for an opposing strategy (McLaren, 2012:30).

Ownership, Pride and Resistance

Rather than moving with, and following trends, some people style themselves in ways they have never made a detour from. These individuals fashion a look wearing the same style of clothing, hairstyle, or grooming applications which may have previously conformed to a current trend, but they have since chosen to continue with. In making these choices it is possible to argue that a process of negotiation and action has taken place at a particular moment, and 'what a body can do is a material act and it also has a degree of agency' (Hickey-Moody and Page, 2016:7). It isn't always clear if individuals are subscribing or resisting to an on-trend style. Or, if they subscribe and resist at the same time. What is apparent is that forms of engagement take place that can offer an alternative view and throw up contradictions in the way fashion and culture operate.

Aoife, (fig:1) makes a bold statement by noting, "I dress however I bloody want to dress" in response to a question about what her outfit said about her (Sawyer, 2015). Her response was, "For years, I was scared of what people thought of me and felt like a chubby weirdo. As I've come to terms with myself...this outfit shows my inner confidence on the outside" (Sawyer, 2015). Aoife's candid confrontational approach certainly illustrates she has a style she owns and makes it clear to the reader she is assertive about what her attire says about her. Aoife's comments acknowledge her acquired confidence and how this has positively affected her sense of self and wellness. While it may be argued Aoife's comments are part of the usual rite of passage of youthful uncertainty, it is apparent a positive and empowering shift has occurred. In its multiplicity of forms, engagement with fashion, power, and 'contemporary art practices call us to think anew,

through remaking the world materially and rationally' (Hickey-Moody and Page, 2016:1). Individuals who have not made any particular attempt to be stylish - whatever that really entails and means - and choose instead to appropriate an outward facing image that does not align with any specific current fashion moment, in doing so embody a look that becomes their own. They can be understood as the conformists, who non – conform, and resist current trends through the physical rendering of material adornment. These aberrant individual forms of visual spectacle have taken ownership through an organic, or pre – meditated self - process. It is these bodies that the focus here is concerned with giving visibility and voice to, as they have fashioned themselves through oppositional actions in the practices of dressing the body.

Appropriation, Fiction and Media forms

Fashion, television, and cinema visually embrace and refer to characters who exist on the periphery of society, or are at times marginalised in some way. Some characters are retrospectively afforded with cultural capital and a fan base via the secondary lens of the media format they are viewed through. For example, the character Barb from the television drama Stranger Things (2016) has a strong online following and furthermore, is acknowledged as a 2016 style icon by the Guardian newspaper. And while the article is underpinned with subtle humour, it is acknowledged that Barb's eighties look fits well with a thrift store image of a misunderstood teen. Echoes can be seen in the Gucci 2016 Spring Summer collection (fig: 2 &3). Both Barb and the Gucci model are presented with vacuous expressions and appear disengaged and unaffected by what is around them. It is possible to suggest, one image would generally be understood as typically fashionable, and the other, would not. One could argue the styling of the Gucci model has in some way been indirectly influenced by characteristics that resonate in Barb's image. In this instance Barb, as a visual metaphor, could be understood to operate as both the cause and effect of fashion's discursive power, relations, and systems.

Cochrane (2016) pays a tongue in cheek tribute in her textual homage to Barb as style icon and notes, 'Barb, casts a long shadow across my style in 2016. It wasn't difficult...the bottle top glasses...the John Hughes heroine – worthy gormless expression...and Clearasil concealer habit only added to her case'. The paradox here is it is the attributes generally associated with ugliness, rather than beauty that are endorsed. As Cochrane, further notes, 'I am now the owner of several frilled blouses and a questionable tatty blue vintage ski jacket' (Cochrane 2016). The attributes of this non-conformist, outsider character are acknowledged, re-appropriated, celebrated, and respected. The adoption of style – through a physical intertextual reference - from a fictional character is a direct effect, 'the concept of taking something on, of changing in relation to an experience' (Hickey-Moody & Page, 2016:8). It could be further argued, the change here, is in being inspired to adopt a form of dress initiated through engagement with a television or cinematic influence. A small change perhaps. But it is a change nonetheless.

Difference, and Aberrant Detours

But how does difference operate and become manifest within social and cultural systems that often result in rendering non-conformist individual subjects as abnormal if behaviours/practices are not in line with those who maintain the status quo? (Foucault, 1998, Butler, 2009, McLaren, 2010). Recognition and the actions of difference and otherness can play a vital part at a micro level in a progressive and positive disabling of structures or rules, where any aberrant detour from established and sustained discursive practice can enable change. In this sense it is the way in which individuals - who may or may not be consciously aware of fitting in with societal norms - pose an interesting contradiction for consideration as it calls into question the idea of following fashion.

An imaginative, sensitive, and sensorial style of external expression can conjure up a visual notion of the poetic. Whether straying from a defined path, or actively deviating from cultural trends the poetic body can offer an essence of life that is usually rendered invisible. Stilgoe notes by 'calling attention to the signifi-

cance of material imagination, Bachelard was conscious of the formation of a new concept, necessarily required for a complete philosophical study of poetic creation...to a philosophy of art, and to reverberations of poetic image' (Stilgoe, 1994: xvii). A key point to note here is the notion of reverberation which can be understood to be an after effect, something that is left behind, and can be experienced by another and which may have lasting effect. The reverberations can be either real or imagined as the poetic experience can exist in multiple environments, via the body and in the mind.

Bachelard (1994) noted the by-products of creative thinking and doing are to be seen and understood as works of art.

While it can be argued some individuals make an active stance toward presenting an oppositional or counter cultural view and use the body as physical matter to position and make statements of the self, in contrast it is also possible to see individuals who make active choices to refute on trend signposting through the various media outlets. Or perhaps simply opt out of the established fashion practice of following the cyclical outcomes of fashion production. People simply do their own thing. Whatever that thing may be.

Custom Made Fashion Contradictions

Nancy Featherstone (Fig: 4 & 5) has custom made and worn co-ordinated outfits with her husband Donald Featherstone for 38 years. This daily encounter with another has arrived at a personal style that actively acknowledges a non-engagement with commercial fashion practice. Featherstone notes "We're not concerned about following fashion" (Featherstone, 2013). The constructed outfits are realised to promote a sense of humorous togetherness. It is fashion, but constructed through a set of personal conventions that operate outside of mainstream fashion practice. The Featherstone's are a couple who coexist in tandem with one another. Despite their co-ordinated style of matching outfits, "[they] both have strong identities and wearing the same clothes doesn't effect this. Clothes don't make your personality" (Featherstone 2013). Here Featherstone assertively states a relationship with a creative process exists, but that it does not conform to on trend fashion conventions. Donald Featherstone was the artist who designed the iconic plastic garden pink flamingo in the late fifties and his wife Nancy adds "he is comfortable wearing distinctive designs. Whenever I see flamingo fabric I buy some and make us an outfit; we now have more than forty in their own special closet" (Featherstone 2013). There is a strong following for late fifties kitsch memorabilia and clothing, and while the couple do not see themselves and their creative actions as mainstream, they would operate as style icons of a subculture that is now mainstream and offered to consumers through commercial outlets. The Featherstone's do not follow fashion but can be understood to have been an influence of a popular retro look that is cyclically acknowledged in magazines in fashion stories. There is a visible echo and footprint of the past in the Featherstone's clothing choices that continue to ripple and reverberate within contemporary fashion. The paradox is the Featherstone's non–fashion lifestyle styling choices are also the choices of trendy hipster fashion consumers.

In 2013 the couple had in excess of six hundred custom made matching outfits made by Nancy Featherstone with identical matching accessories. "We decided to go full time with our identical look and never needed to go shopping again" (Featherstone 2013). The constitution of bodies and ourselves can become manifest through a proliferation of discursive practices that one may or may not actively engage with, 'where embodiment is a process of encounters with other bodies' (Springgay, 2008:2) At their work conventions the Featherstone's noticed, "people would seek out our stall year after year to see what we were wearing" (Featherstone 2016). Therefore, the co-ordinated attire of the Featherstone's prompted engagement from others who sought them out for specific visual human entanglements and encounters. The Featherstone's kitsch, yet poetic appearance of togetherness seemed to resonate not only with themselves, but also with others. 'It is not a material object which fills another by espousing the form that the other imposes. No, it is the dynamism of life itself which by engulfing and appropriating everything... it

finds in its path...making it reverberate, breathing in to it, its own life' (Bachelard,1994: xvii). Stilgoe (1994) draws upon Bachelard's ideas and makes further comment– 'If having fixed the original form in our minds eye, we ask ourselves how that form comes alive and fills with life, we discover a new dynamic and vital category, a new property in the universe' (Stilgoe,1994: xvii).

Similarly, Barthes (1980) has a view of being consciously or unconsciously touched by the visual image, or sight and notes the way in which an individual's view is arrested by either a significant or insignificant aspect of a visual experience, in that an individual becomes acutely aware of a presence of something. Barthes refers to this as the '*punctum*', a prick or puncture that takes place and initiates an experience of physical active participation with something specific in view. On the punctum Barthes notes '...it is not I that seek it out, it is this element which rises from the scene...and pierces me...it refers to the notion of punctuation...with these sensitive points; these marks are so many points. (Barthes, 1980:26) A physical response takes place with the viewer's body reacting to a sight and physically encountering it. And as noted by Stilgoe, 'All that belongs to the material and palpable world' (Stilgoe,1994: xvii)

Poetic Social Punctuations

In their work on New Materialism, Hickey-Moody and Page (2016) discuss arts and cultural resistance and a shared belief in the creative and transformative capacities of matter. They draw upon ideas of philosophical thought that has its roots and development in established continental philosophy (Heidegger 1962), and acknowledge that matter, - and a specific focus noted here is on bodies and things as matter – has an ability to culturally resist established protocols. In terms of matter becoming arts through various forms and practices, Hickey- Moody and Page note the way in which signification and process is carried out at the level of consciousness, and discuss the political power of creative actions. It is possible to further establish that 'cultural theorists respond to the increased attention being paid to matter and creativity...often referred to as new materialism.' (Hickey-Moody and Page, 2016:1). A key point Hickey-Moody and Page refer to is the way 'creative making impacts on thinking, ...to the reinvention of social relations' (Hickey-Moody and Page, 2016:1). Looked at from this perspective it can be argued that micro-challenges are made to established fashion protocols and cultural norms, often through unrecognised day to day creative actions.

Individuals style and appropriate the body as physical matter. And in this sense matter is used to acknowledge a body as active matter and being in the world (Heidegger, 1962). It is pertinent to recognise what and how bodies as matter can actually operate. As Barad (2007) and Deleuze (1987) pose the question, what really can bodies do? 'Matter is agentive, inter- determinate, constantly forming and reforming in unexpected ways'. (Coole and Frost 2010:2) This position further argues the body is an active and unpredictable force. 'Such a perspective abandons any idea of matter as inert and subject to predictable forces' Hickey-Moody and Page, 2016:2) Moreover, individual subjects operate and negotiate responses to culture within a variety of ways and are not passive absorbers of societies ideas, concepts, and practices. Subjectivities are fluid and formed both inside and outside of the body and it can be argued bodies accept and refute codes at the same time, thus rendering bodies in flux and engaged within oscillating processes of movement. 'Matter is always becoming, matter feels, converses, suffers, desires, yearns and remembers, and since feelings, desiring and experiencing are singular characteristics or capacities of human consciousness.' (Barad, cited in Van der Tuin, 2011:31)

Fashion relationships

An example of fashion being used in unique ways to serve specific purpose is visible via an online portal. The 'reagandoodle' Instagram account has an impressive online following and the user presents images and text of a family who habitually dress their foster child and family pet in matching outfits (fig: 6&7). The attire includes both day and nightwear and attempts to use clothing and identical styling to align the child

to his new family and environment. The child and dog are simultaneously photographed together and it could be argued the family aim is to use co-ordinated clothing as a bonding tool to instigate collective togetherness. The account has the ability to pose questions about family. Is the dog presented as sibling? The child as animal? Or, perhaps they simply coexist happily as a family with a sense of humour. However, Hickey-Moody and Page (2016) acknowledge the ability that new materialism, 'offers a re-definition of wellness, and human - non-human relations' (Hickey-Moody and Page, 2016:2). It can be argued looked at from this perspective, the alignment of dog to human, human to dog can underpin a larger and more important narrative of familial inclusion and sense of collective belonging. And it is through the use of the clothing that cements the point the family could be unconsciously choosing to make. A foster child, is not a negative notion in contemporary cultures and societies, but a non-biological parent - child relationship can render individuals to feel different. Therefore, using clothing and animals to work against the biological/non-biological family binary can challenge established conventions about family in a positive way. 'Bodies and things are not as separate as we once thought, and their interrelationship is vital to how we come to know ourselves as humans and act with other environments' (Hickey-Moody and Page, 2016:3).

Blackman (2008) further emphasis this point and notes 'exploring the porous nature of bodies and their co-construction through and with systems of meaning maps the selection of concepts (and constructs) including regulated and regulating bodies, communicating bodies, and difference, lived bodies, and the body as enactment.' (Blackman, 2008:139). In this sense the body as matter (fig:8) can be understood to operate in terms of daily mobility and agency in parallel with adornments not usually associated with clothing or style. The image captures a woman operating in tandem with a series of objects that are part of her everyday experience. The woman has collected items and adorned her mobility scooter, and has a living relationship in the environment with it, and her body. They operate as one, yet are separate at the same time.

The collected assemblage of objects may be understood to signify personal experiences that have taken place that are shared with others. There is a powerful and at the same time sensitive personal style visible to the viewer and it is here Springgay's (2008) position where embodiment is a process of encounters is visibly manifest. The assemblage is made from individual personal donations and can be understood as matter brought into being through collective encounters. Or perhaps, this body matter is a visible public art-form shared individually and collectively with those who engage, actively participate, and enjoy the wonderful poetic creativity on display. 'The body is pivotal to new materialism; it is a complex intra - action of the social and affective' (Barad, 2007:338). Intra-action refers to the movement generated in an encounter in the process of becoming different. Barad (2007) acknowledges a process of entanglement takes place and emerges through intra-actions. The intra-actions afford the viewer a delightful spectacle that demonstrates and displays affectionate social encounters.

Conclusion

Living matter, agency, and resistance take shape and affect culture in many ways. Bodies are appropriated with things and the resulting outcomes can make a challenge to existing cultural ideas and concepts. Sometimes there is a conscious acknowledgement by individuals who set out to break with convention. For others there may be no particular rationale, other than simply living. What is certain is the way in which a set of actions can reverberate and affect future actions, where something materialises through another, can be 'one component...of living that entails coming into attunement with the world around us in ways that unfold our capacity for joyful living rather than engage us in the deadening repetitions of what worked for us in the past' (Lorraine 2011:2).

Wandering in streets, towns, and cities as an observer offers the ability to appreciate the way in which matter, bodies, and creativity align and can strike a chord in understanding ourselves and others. Similarly, online portals offer locations for discovery for users to engage with and reimagine how bodies as living

matter operate and generate new forms of understanding. Moreover, the way bodies are adorned and physically manifest in culture continues to offer new ways of acceptance and inclusion. People find their own ways to subvert existing practices that may or may not operate to contain them and, 'any scrutiny of cultural discursive practices needs to be able to account for the subversion of potential rebellion' (McLaren, 2012:96). The individuals and characters captured here are some of the many who creatively nudge at boundaries to make literal marks in the cultures and environments they exist within.

Individuals can, and do refute the interpolative 'call and response' of fashion, cultural, or societal discourse, and as mentioned previously, ironically can become unique fashion or artistic statements in their own rite. Therefore, the overarching objective of this paper looked towards an acknowledgement, appreciation, and positive celebration of the way in which difference, and different bodies, both human, and non-human are played out by individuals within contemporary time and space, although at times people are not always consciously aware of doing so. Artistic actions and creativity initiated via the body as independent and collective appropriations and entanglements can and do find ways to challenge, reverberate, and initiate change through the appropriation of the body as living matter. These subtle forms of activism offer an appreciation of difference and are 'a pure recording of something that is happening around us: a strong affirmation of freedom, beyond cataloguing and labelling' Cartner-Morely (2016). And isn't that pleasing to know.

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Images

(Fig:1) Aoife – 'I dress however I bloody want to dress' Image: Katherine Rose for the Observer www.observer.com Accessed on 28th November 2016

(Fig:2) Image: Barb – Stranger Things Guardian Style Icon 2016 Netflix Guardian www.guardian.com Accessed on December 16th 2016

(Fig:3) Gucci SS 2016 Guardian www.guardian.com Accessed on December 16th 2016

(Fig:4) Featherstones, Nancy & Donald 2013 www.guardian.com Accessed on November 16th 2016

(Fig:5) Featherstones, Nancy & Donald 2013 www.guardian.com Accessed on November 16th 2016

(Fig:6) Regandoodle Instagram www.regandoodle.com Accessed November 18th 2016

(Fig:7) Regandoodle Instagram www.regandoodle.com Accessed November 18th 2016

(Fig:8) Image: Anna Lord, Toronto, Canada (2016) Photographer: L. Gray (2016) Decorative and utilitarian: styled with an assemblage of toys donated to Anna by young children from the local neighbourhood.

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Corruptive systems of fashion

Papers & Abstracts

Abstract: Breaking the Rules in Pattern Cutting: an Interdisciplinary Approach

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ABSTRACT

In higher education the practice of pattern cutting is taught in a variety of ways. This ranges from introducing traditional methods of flat pattern cutting and tailoring, draping materials on the dress stand, to using complex 2D and 3D, pattern development software. Pattern cutting combines knowledge of body measurements and body proportions to create a three-dimensional form, which fits the human shape. It amalgamates empirical knowledge with theoretical approaches that utilize a combination of technical and creative skills. Research has shown that many fashion students find pattern cutting challenging because it is often presented as a methodical and mathematically complex discipline, divorced from creativity. Arguably it would have more appeal if presented as a creative craft underpinned by technical skills that use a set of basic rules and procedures (Almond, K, 2013; Bailey, Drew and Shreeve, 2004; Sayer & Studd, 2006). Once an understanding of the basic rules has been acquired, their manipulation using a variety of techniques should be encouraged. This enables the students to find methods that promote creativity and disrupt conventional approaches. The theme of the conference is about breaking rules, which involves going against a set of regulations, which direct a practice or method within an area of activity. This mutinous concept can make pattern cutting appear more exciting and creative to the student and often leads to them exploring concepts and approaches from other disciplines. The aim of the research is to investigate ways to effectively implement interdisciplinary activity into the teaching of pattern cutting to disrupt and shatter established rules. Interdisciplinarity involves the combining of two or more academic disciplines into one activity (for instance in this enquiry, pattern cutting is merged with disciplines such as health and engineering). It is about creating something new by crossing boundaries and disrupting pre-conceived ideas by drawing on different methods and epistemological perspectives. The research explores the use of disorderly forces leading to the development of new approaches for teaching pattern cutting. It reviews a wide range of literature that analyses new technologies and alternative approaches to creative innovation. The application of this knowledge to pattern cutting both in industry and education, has the potential to enrich the fashion industry as it encourages pattern cutters to develop essential skills to cross discipline boundaries resulting in new, novel and innovative clothing.

Selling the Local in a Global Market:Marketing Artisanal Fashion in the New Creative Economy

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Artisanal entrepreneur, craft, designer-maker, fashion designer, ICT, markets.

ABSTRACT

Local fashion entrepreneurs are disrupting traditional business models, posing an alternative to mainstream fashion practice. This new phenomenon is viewed in the context of what Luckman (2015) calls a crafting renaissance of the pre-industrial artisanal model. Despite the term 'artisanal' being widely used in marketing to describe hand-made goods in various sectors, conflicting parameters have shaped its emergence, from changes occurring in information communication technology (ICT) to a desire by consumers for the 'authentic'. Niche fashion practice has been discussed in the context of slow fashion and in studies of independent fashion designers, but this paper investigates exclusively designer-maker fashion businesses, examining how and why selling through local designer markets, combined with platforms such as Etsy, this model has grown in a difficult and volatile industry.

To examine the artisanal entrepreneur, the paper draws upon a qualitative collection of data from interviews, e-commerce and facilitator websites, along with a literature review and analysis of industry reports. In addition, the reflexive observation of designer-makers selling at markets, and my own experience as a bespoke designer complements this investigation, through a cultural studies framework.

From this analysis, I identify three key findings. First, a ground-swell of makers and consumers are departing from the mainstream, generating their own creative economy. This unique marketplace has led to a coupling of creator and client, ignoring or admonishing the larger fashion system. Less reliant on complex global supply chains and offshore labour markets, these micro-entrepreneurs are operating within the bounds of self-regulated networks of knowledge, resources and ingenuity, opting for sustainable local production. Second, artisanal designers identify factors other than economic, as markers of success. Designing on their own terms, avoiding the usual seasonal fashion rhythms, they include self-determination, freedom of creative expression, and the simple desire to 'make' as more valuable than financial gain alone. Finally, artisanal designers are 'playing shop' with their consumer/friends and are inadvertently disrupting conventional enterprise models via interest oriented websites rather than product specific platforms. They are not only generating sales but meeting and bonding with like-minded communities globally, building entrepreneurial confidence, identity and income. This way-of-life embodied by artisanal designers underpins their success in the market and is eagerly supported by devoted consumers. The designers are arguably "breaking the rules" by disrupting classic business models, and offering the practitioners the ideal of a long term, creative and viable fashion business.

Introduction

Recent disruptions in the creative economy have led to the rise of a new class of fashion entrepreneur, operating on the margins of the mainstream fashion system. This forthright entrepreneurial spirit permeating the fashion context, sees designers making by hand, working locally from small-scale studios, and selling globally on genre specific web platforms. These entrepreneurs are disrupting traditional business models, avoiding classic production and marketing strategies, and creating their own interest based economy. Conceptual or elite designers, that form part of the high fashion or mainstream fashion system, have been investigated in a number of studies (McRobbie 1998; Malem 2008; Molloy and Larner 2013; Craik 2009). However, this paper examines the independent designers working in niche markets, who have not received as much attention from researchers. The impetus for this study comes from my own practice outside the mainstream fashion industry in custom bridal design, which, although different from that of the designers investigated, shares the ethos of hand making garments for a local clientele. The revalorisation of craft, self- determination and unconventional marketing are central themes in this enquiry.

I designed this research using a multi-method approach informed by cultural studies, with case study methodology at its heart. I draw upon empirical data, gathered from in-depth interviews with local Brisbane independent fashion designer label Alice Nightingale. This label was chosen because it closely aligns with 'slow' and 'maker' philosophies in its approach to enterprise, production and marketing. As the differences in practice are nuanced within the independent designer sector, according to Yin (2013, 4), "Case study methodology is the method of choice when the phenomenon under study is not readily distinguishable from its context". The choice of Brisbane is significant because it is not considered a fashion city (Buick and King 2015) which, according to Skov (2011), allows for the quirky and unusual to thrive, away from the critique of mainstream fashion observers. Beyond the case study, informal discussions with a further ten designers and intermediaries including consultants, suppliers, agents, designer market convenors, fashion journalists, and consumers were conducted to help contextualise and enrich the data. Finally, my own knowledge of small-scale fashion business was pivotal in analysing the extent to which marginal independent fashion designers are both disrupting traditional fashion processes, and "breaking the rules" by presenting an alternative business model.

Literature Review

In order to position this empirical study, the following literature review examines the changing roles of the independent designer in the current creative economy. Discourses on the terms that circulate in academic literature relating to the practices of marginal independent designers differ widely and include concepts like elite designer, activist, experimental, dressmaker, designer-maker, artisanal designer and indie designer. However, for the purposes of this paper, the term 'designer-maker' is used. This practitioner is identified as making fashion by hand, using non-automated processes, commodifying vocational skills as an 'artisanal entrepreneur', maintaining a micro business (0-4 employees), and using web 2.0 technology to market and sell globally.

The independent fashion designer

In the mid-1990s sociologist Angela McRobbie undertook one of the first studies investigating the independent fashion designer. McRobbie's participants found it difficult to survive independent entrepreneurship, regardless of media exposure. McRobbie (1998) points to a lack of business knowledge and production skills, exacerbated by limited opportunity for distribution, as the major factors in the designers' perceived lack of success. The designers also did not produce their own garments, as they were trained to design and create the first pattern draft, and then have it made by others. Business, marketing and cash

flow management where also not a significant part of their education. About a decade later, Malem (2008) investigated the precarious income of independent designers, their recognition of the problem, and their survival strategies. Malem observed that the designers were using more business and marketing theory techniques rather than relying solely on design skills, as was the case with McRobbie's participants, and this improved their chances of survival. McRobbie's more recent (2015) study of fashion designers in Berlin shows a much different picture than the one painted twenty years earlier. The economic conditions have changed and McRobbie describes these more self-reliant designers as 'neo-artisanal' explaining their involvement in humble neighbourhood initiatives, sharing, collaborating with, and educating others (McRobbie 2015, 118). The 'new' designers have different markers of success to those of the past or indeed the mainstream or elite fashion system, seeking out a modest existence, content with small scale local production, while pursuing creative satisfaction.

Artisanal entrepreneurs

The new class of independent designer emerging on the periphery of the mainstream fashion system, sees hand-crafting as its cornerstone work process. Social researcher Susan Luckman (2015) observes the rise of do-it-yourself (DIY) craft markets and online platforms such as Etsy as facilitating the work practices of these self-proclaimed designer-makers (artisan 2016). According to Gregg (2008), the solo entrepreneur is also shaping the evolution of the flexible workforce. This coincides with Ellmeier's (2003) observations on the transformation of the cultural worker into a cultural entrepreneur (Ellmeier, 2003). Hence, although derived from the pre-industrial cottage industry model, hand craft processes and artisanal entrepreneurship are providing the stage for a new 'politics of work' (Greenhalgh 1997), initiating a socially understood discourse surrounding this 'workstyle' (Larner and Molloy 2009). The implications for cultural entrepreneurship of this digression from mainstream fashion practice is that the revalorisation of handwork is forming a new cultural economy.

Meanwhile, the 'slow' movement represents a combination of philosophies and modes of work that also align with artisanal entrepreneurship. Slow fashion relates to various forms of production and consumption including recycling, upcycling and fair work (Fletcher, Grose and Hawken 2012). Slow fashion advocates value quality production and derides the image of the disposability of fashion (Cataldi, Dickson and Grover 2010). According to Fletcher (2010), slow also posits a new connectedness between user and maker. Although slow fashion does not refer to hand crafted clothing alone (Pookulangara and Shephard 2013), it is allied with the artisanal entrepreneur's preference for local and responsible methods of production. The importance of authenticity for the artisanal designer lies not only in the hand making process, but the preference for intimacy and connectedness with the customer by remaining small scale. Lise Skov (2011) compares large and small-scale enterprises, observing the tendency towards small-scale and local production amongst designers within second tier cities, seeing this option as a means of survival. Small scale production represents less risk and helps maintain the longevity of the business, albeit at a modest income (Pasquinelli 2012).

Artisanal designers are also recognised by their fashion aesthetic. 'Indie fashion' was initiated by the independent musicians who emerged in the 1990s. The look included skinny jeans, vans sneakers, facial hair and fedoras (Oakes 2009). In classic trickle/bubble up/across fashion theory (Veblen 2007; Blumer 1969; Polhemus 2010) the indie look has influenced not only small-scale designer-makers, but the design direction and marketing campaigns of much larger global corporations. These include mass market chain Urban Outfitters (Linkins 2011), luxury brand Roberto Cavalli (2015), and trend forecasters WGSN (2016). The predominance of hand crafted components, a sense of 'authenticity' in flawed and distressed materials, and a preference for the obscure is evident in their campaigns. Hracs, Jakob and Hauge (2013) note that the recognition of the handmade processes that inspire the look, to an extent facilitate the survival of the smaller, original indie designers as well. Hence, the use of the term 'indie' can refer to either an aesthetic style or a mode of production, or both. The hipster is the market driven consumer of indie design (Rabkin 2016).

But Schiermer (2014) warns that whereby indie tends towards risk and rebellion, 'the hipster culture is not a counter culture but a conserver culture' (Schiermer 2014, 177) with its preference for irony and nostalgia. To be clear, hipsters consume not only handmade clothing, but indie styled fashion (such as from mass production brands already mentioned), which is not necessarily 'authentic'.

Findings

The literature shows a patchy understanding of the terms surrounding designer-makers and artisanal entrepreneurs. This understanding has been affected both by romanticised notions of authenticity, originality, and the handmade in marketing hyperbole, shifts in work practices and historical nuances. In order to distinguish some of the indicators of these marginal designers, I now turn to the empirical data gathered on the independent label Alice Nightingale, which illustrates to what extent methods of production and marketing have diverged from, and even disrupted the fashion system, leading to the emergence of a less conventional form of fashion business. The findings are discussed in three themes: The designer-maker, Creative lifestyle, and 'Playing shop'.

The designer-maker

The maker phenomenon grew out of the learning-by-doing ideologies of technology tinkerers in the late twentieth century (Dougherty 2011). The movement and its philosophies, have permeated a corner of the fashion industry. Meanwhile, in the larger fashion system, uncompetitive local labour costs have led large manufacturers to move production offshore leaving little or no work for designers in their originating countries (Weller 2008). This led to the rise of small start-up labels, founded by both emerging and experienced designers. However, independent fashion businesses can vary greatly in their production and dissemination approaches.

Alice Veivers, the designer behind the case study label, Alice Nightingale, is representative of the category of independent designer-makers, distinguishable through aesthetics, philosophies and low-tech modes of production. Artisanal entrepreneurs are less reliant on the global supply chain and the cheap off shore labour that led to the disruptions in the creative economy in the first place, opting instead to produce locally, often in-house. For example, Alice makes all her garments, and acquires most of the materials from a New Zealand based mill. She adds value by having her fabric printed locally. Although local labour costs are higher, she has more control over the quality, time and environmental impact of the garments' production. Alice purchases supplies on an as-needed basis, often also recycling vintage haberdashery or waste products into garment decorations and accessories while knitting garment components on her (self) refurbished knitting machine. These measures also cut costs, reduce risk and help her adapt quickly to demand. Artisanal entrepreneurs have an ad hoc method of production because they have no need to adhere to the seasonal presentations of the standard fashion calendar. At most preparing for occasional markets, Alice develops her own production rules. She designs and produces 'what's selling' currently and does not necessarily plan ranges. According to local fabric agent Kellie Ireland Bell (2016b), such operations have increasingly affected the mainstream fashion system because artisanal designers are avoiding the use of agents, wholesalers and other middlemen (Ireland Bell 2016a, Rantisi 2004). This departure from the usual channels of procurement has in turn led to the rise of web enabled business-to-business platforms like Makers Row (makersrow.com 2016) and Etsy Wholesale (etsy.com 2016), arguably generating an alternative fashion supply system.

Artisanal fashion practices are characterised by their choice to remain small scale, which contrasts with the capitalist economic model of growth (Hesmondhalgh 2002). Furthermore, working in smaller cities sometimes provides an advantageous point of difference for designers. For example, Alice believes that designers can make a place for themselves locally, especially in Brisbane because it is a smaller city than Sydney or

Melbourne. 'I was the first at the Melbourne markets to stand out with bright colours. I seemed ridiculously quirky at the time' (Veivers 2016).

Resourcefulness, making-do and thrift practices also characterise enterprises outside the margins of the larger system. Overheads are minimised through cost saving initiatives like sharing spaces, materials and equipment. When Alice needs new equipment, she will either source it second hand, online, or make it herself:

> *Sometimes I don't have the equipment that I need, so I learn how to make it, like working with wood. I made all my own clothes' racks. Making all my own things is one of my life's philosophies (Veivers 2016).*

The collaboration and peer to peer mentoring that niche designers are undertaking within their own interest groups does not occur to the same extent in the more competitive mainstream fashion system. Moreover, this assistance comes in both electronic and physical form (Kuhn and Galloway 2015). This includes networks, not only of the designers themselves, but of intermediaries, including online support, market convenors and niche media. Websites like Etsy and its off-shoot blogs generate numerous posts on how to produce, market and sell, to the point of developing online courses and a sellers' handbook (etsy.com 2016). Alice is an active participant in both giving and receiving business self-help, as well as sharing crafting techniques (thecraftcoven.com 2016, FrankieMagazine 2016), which again characterises members of this group of fashion practitioners.

Creative Lifestyle

Figure 1: Veivers, A. 2015, Quoll print. Alice Nightingale original print on 100% cotton.

Figure 2: Veivers, A. 2014 'Heads' dress. Alice Nightingale original print on 100% cotton.

The fashion system of the late twentieth century has been subject to critique for some time, with Fletcher (2007, 2010) pointing to the importance of personal and intrinsic convictions that can lead to change. Artisanal entrepreneurs prioritise personal values, satisfying their desire for creativity and originality rather than bending to trend driven market forces. Handwork, creativity and the materiality of making are fundamental to artisanal designers' motivations. Alice discusses the dangers of being led by market forces rather than creativity. For example:

> *My friend Clare has a 'lifestyle' online shop. Seed (a large clothing and lifestyle brand) wanted her hand sewn rope baskets but it was too much to handle.*

> *This impacted on her creativity because she kept making the same basket. (Veivers 2016).*

The designers are redefining success for themselves by including flexibility and freedom into their processes (Leberecht 2015). Therefore, the workflow is not highly systemised, automated or powered by technology (technology would require significant financial investment and also creates a distance from the materiality of making). But this is not to say that there is a lack of skill or knowledge. The designers adapt their competencies in a lean and agile framework, making-do with bare minimums across various aspects in the business, focussing nonetheless on 'making' wherever possible.

Designer-makers embrace the freedom of creating their own aesthetic. Alice describes her indie style dresses as 'demure but quirky', a style which is often not available in mainstream ranges. She reflects on her standpoint for creating original work which aligns with hipster preferences: 'I love my customers and they get sarcasm, there must be sarcasm in the dress' (Veivers 2016). Alice is constantly looking for novel ideas to provide a more creative offering than larger mass-market indie labels like Gorman (Gorman 2016) or Dangerfield (Dangerfield 2016).

> *For instance, I was going to do a wombat print but my partner said to do quolls. They're more unusual and an endangered species. I'm happier about that choice. It's more unusual, and kind of 'in-the-know' (Veivers 2016). (See also Figure 1)*

Alice is building a business that complements her lifestyle, based on her personal values. The designer embodies her 'workstyle' and displays this in her media portrayals and personal styling. She wears her own designs and lives and works in a space that is consciously making a statement about her philosophies, blurring the boundaries between work, private and social life, and this 'authenticity' is appealing to her fan base (Lawton 2016).

Alice's authenticity and conviction, or 'stickability' (Bridgstock 2009), to her craft is admired by the designer's like-minded clients, who are becoming fan-friends. This is demonstrated in an interview with fashion devotee and customer, Alex Lawton. Alex recently attended a fashion networking function (specifically, the knowledge sharing situation described above), wearing an Alice Nightingale dress, and on answering a question about the dress, she demonstrated knowledge about the designer beyond what would be expected of an 'ordinary' purchase. Currently working as a graphic designer, the former architecture student in her early twenties is an avid follower of handmade fashion (not just Alice Nightingale). Alex and her peers are typical of the designer makers' followers, working predominantly in the creative industries and consciously shunning mainstream, and especially fast fashion. Alex aligns artisanal fashion with slow fashion, and she sees each piece as a work of art. 'You should see my wardrobe. It's full of colour and texture and beautiful unique things' (Lawton 2016). For Alex and her friends, the uniqueness lies in the process and stories behind each creation.

> *Artisanal designs are more like art pieces in themselves, considering the amount of detail that goes into them. Meeting lots of the designers, you can just tell from their expression, they have put so much effort and heart and soul into it" (Lawton 2016).*

This speaks not only of the connectedness and interaction that current consumers seek and find amongst designer-makers, but of the desire for originality in creative output (Kozinets and Handelman 2004), and the cultural contribution of the designers. Following the trend for mobility of many of her generation, facilitated by ICT, Alice is not entirely place bound, and considers innovative ideas for marketing.

I see myself travelling around the country with a sewing machine in a caravan. I would have multicity publicity. I would post travelling dates. I'd be a travelling seamstress. I would try it first in England (Veivers 2016).

This also reveals the designer's somewhat romanticised view of her lifestyle. It points to the sense of mobility and temporality felt by current designers, which in turn helps them to cope with the unstable nature of the business model. This is because the business is built on minimal foundations which are easily dismantled and transported, especially with the help of ICT. Resources, like shared spaces could also be found in any locality today. Designer-makers are not taking part in glamour fashion festivals, and are no longer waiting to be 'discovered' by the mainstream media. Instead, they are connecting with niche media, bloggers and magazines, and podcasting their personal stories online. Magazines and blogs such as *Frankie* (frankie.com 2016) and *Peppermint* (peppermint.com 2016) have recognised the appeal of the designers' whimsy and are forming mutually beneficial marketing opportunities.

Playing Shop

The artisanal enterprise model is distinguished by alternative and often humble pathways to selling. Building on the intimacy and connectedness expounded by this model, its marketing aims at the unconventional and the genuine and has directed the consumer's gaze to 'behind the scenes' glimpses of work-in-progress. Far from the glamour of upmarket precincts, the artisanal entrepreneur is likely to work and sell in idiosyncratic settings. Consumers are invited not only to markets but to pop-up shops, repurposed laneways, shared workspaces and home studios. These spaces are often un-renovated and not sophisticated. This provides their very attraction, by implying a sense of belonging to a counter-commercial culture. Thus, the use of 'recycled' spaces is symbolic, and aligns with a broader, 'authentic' ethos exhibited by marginal designers.

The artisanal entrepreneur's point of sale preference is the outdoor market. Alice sells the garments she has made during the week at the 'Finders Keepers' designer markets at regular intervals, both locally and interstate. The Finders Keepers market scheduled for May 2017 boasts 250 exhibitors (Finders Keepers, 2017). This form of commerce is affordable, popular, transitory, and facilitates the direct association of producer with the consumer (Finders Keepers 2014). Through displaying distinctive tastes, these markets have also recognised the desire for authenticity and connectedness and have brought together like-minded communities of consumers (Westbury 2015; Levine and Heimerl 2008). Markets provide a commercial platform which contrasts with more conventional (shopping mall) or high-end (boutique) points of sale, again disrupting the traditional status quo and offering a less structured form of transaction (Bianchini and Maffei 2012). The very placement of the markets in the city's cultural precincts (adjacent to the art gallery or the state library), the addition of specialty food and music, often overlaid with a sustainability theme, adds to the cultural experience of the well-to-do, intellectual and creative clientele (Tutty 2013, brisstyle.com.au 2016). But markets are often temporarily repurposed sites. On the one hand, this transitory 'here today-gone tomorrow' nature, adds to their allure, on the other it destabilises the income for the designers, which means that they may require additional means of income.

Innovations in technology have offered the artisanal entrepreneur with visibility and marketing opportunities formerly not possible, and at a negligible cost. Unlike the former Web 1.0 static format which allowed data only to be read, Web 2.0 allows for user interaction including e-commerce, social networking, blogging and video streaming. According to Anderson (2012), this participatory web has dramatically changed micro-enterprise (MSE) designer businesses' communication and distribution opportunities. Beyon Web 2.0, Web 3.0 connects computer to computer, potentially allowing for more tailor-made searches, with Web 4.0 presenting a mobile version of these capabilities (Flatworldbusiness, 2017). Web 3.0, 4.0 and 5.0, state of the art technology is not yet accessible by artisanal designers but may well form part of their future.

The use of ICT for marketing extends seamlessly to online selling (Ross 2012). The paradigm of interactive shopping websites for artisanal entrepreneurs is Etsy, 'an online marketplace where artists and collectors sell their handmade goods, vintage items and craft supplies' (Etsy 2012,1), and the ideal, genre specific site for Alice Nightingale. According to Etsy, the platform that has grown to $2.39BN in turnover since 2005, and is ranked at number 8 worldwide after amazon.com (at No.1) (similarweb.com, 2017), the sellers are 'building businesses on their own terms, prioritising flexibility and independence over rapid growth, and using Etsy income to build resilience in the face of declining job security' (Etsy 2012 1). But a cynicism exists which suggests that artisanal practices are not 'real fashion', or worse, that they don't make money. Alice claims that the industry she is in "is not fashion, its craft" (Veivers 2016). She also points out the disdain attached to crafting when she started seven years ago, but that this has changed more recently. She states,

> *The partners of customers that come to the stall, 50-60 year old men, ask or comment that I can't possibly be making money. And I say, well yes, I am! They just still believe in old business ideas. (Veivers 2016)*

Although Alice's income is derived entirely from her business (Veivers, 2016), a quick calculation on average Etsy incomes shows that the revenue for sellers is negligible. And yet, Etsy's popularity increases. This is because Etsy and its community legitimises the artisanal enterprise sphere for the practitioner, affording a sense of status and control of their own 'shop'. Although perhaps better known for small crafted objects like jewellery and less for clothing, Etsy still offers the lowest barriers to entry for designers compared to other clothing sales platforms, with minimal rental at US$0.20 per listing, no contracts or subscriptions and no application processes. Etsy and similar websites may have provided the artisanal designer with an expanded, indeed global market reach which, coupled with the potentially higher price point achievable, improves their chances of survival compared to the pre-ICT designer of twenty years ago (CEA 2016). This access to markets formerly not available to smaller niche producers, is referred to by Anderson (2008) as the 'long tail' of distribution. Mainstream bestsellers are at the head, but the niche market tail is now so long that it represents a significant share of the economy in its own right (Anderson 2008). However, these advantages belie the true economic picture. For example, although they are connecting uncertainty with profit (Brydges, Lavanga and von Gunten 2014), many Etsy sellers are not reaching basic living wages[1]. Although some are thriving thanks to shifts in consumer sentiment and the affordances of Web 2.0 technology, there is evidence indicating self-exploitation and a hidden economy, suggesting the markers of success for designers lie in intrinsic motivations rather than financial realities (Ragtrader 2016).

Although internet marketing is not the main method of garnering sales, Alice is thankful that she can sell to an international following. The Etsy shop has helped to 'even out the peaks and troughs of cash flow' (Veivers 2016). According to Anderson (2008), through digital media and social platforms, we have reached the recommendation age and reputation has become additional marketing collateral for the designer. This means that the metrics of likes and customer reviews are now more widely disseminated than pre-internet, and have become more important than advertising itself [2]. *Vogue* Australia editor-in-chief Edwina McCann agrees, claiming public relations exercises are overrated, maintaining 'your community is more important' (CEA 2016). According to Anderson, we are seeing a rise of the parallel culture-of- interest or the 'micro culture era' (Anderson 2008, 184), which favours less geographic and more shared interests, which is important for Alice and similar designer-makers as her offering is a very limited

[1] An investigation within the top 1000 etsy sellers (of the 1.3 million sellers) revealed average estimated turnovers of approximately $13,000 per annum. (Craftcounter, 2016.com)

2 Alice Nightingale has had over 200 Etsy reviews since 2010, relating to actual product sold whereas instagram provides likes only.

array of demure cotton dresses, the fit, style and palette of which will not find enough buyers in the local area alone.

Designer-makers are avoiding glamour marketing and opting instead for personalised and genuine representations of their work. Their quirky aesthetics and philosophies combine in a cultural contribution which has been underpinned by niche media. Coupled with the affordances of ICT, Alice and similar artisanal entrepreneurs interviewed are surviving beyond local market transactions and supplementing their sales by reaching an interest based clientele globally, through genre specific e-commerce, thereby improving their chances of survival in the already saturated fashion marketplace.

Conclusion

The move of fashion manufacture off-shore and the scarcity of luxury or well-financed large-scale labels has left a scarcity of local fashion designer jobs (AFC, 2016). I have investigated how this space is now filled by a groundswell of designer-makers, developing micro enterprises locally. This paper demonstrates how these small firms are "breaking the rules" of conventional fashion business practice. It contributes to emerging studies on niche fashion practices by shedding light on the revalorisation of craftsmanship, seen both via designer-makers and the consumer interest in slow fashion processes. This development is evident in activities of making, sharing, thrifting and seeking the 'authentic'. This investigation of artisanal fashion entrepreneurs has uncovered unusual business practices showing a cyclic development of both historic, 'cottage industry' style paradigms and modern innovations in business practice, which are arguably causing disruptions in the fashion environment. Furthermore, artisanal entrepreneurs are creating alternative economic subsystems, by 'playing shop', and drawing a degree of capital away from the mainstream (Anderson 2008). This model is different to its pre-industrial antecedent because of its use of internet-enabled communication, which increase markets by satisfying latent niche demand (Andersen 2008). Although not as glamorous or well understood in fashion circles as elite design practice, the new designer-makers are applying their learning-by-doing methods to this model, and with the support of their interest centred communities, are creating an alternative fashion career path. What began as self-determination in the declining fashion job market, has become a freedom of creative workstyle and 'politics-of-work'. This alternative also opens possibilities for fashion students, suggesting that both industry bodies and educational institutions, which usually address conventional fashion business structures[3], need to reconsider this increasing diversity of practice (Kozar and Connell 2013). Additionally, a hidden economy of self-exploitation still exists, and navigating the fine line between success and failure requires considerable expertise. Furthermore, the current disruptions to the fashion system may continue to change fashion practice in the future. The study identifies nuanced differences in the practices of independent designers, which gives policy makers an understanding of where and what support structures may be put in place, and how these can be more effective. MSEs are a growing sector of cultural production in the community and require not just to survive but to thrive if they are to continue to contribute to the cultural landscape. Hence, there is a need for knowledge, advice and planning for the support of these practices (Raffo et al. 2000; Walsh 2009; Douglas 2014). The study therefore poses further questions on how the gap in education and support services for designers working in unconventional ways can be addressed. Do fashion educators and mentors need to reconsider the nuanced differences and provide support which addresses this new phenomenon? With greater awareness of new modes of business practice, in fashion education circles these businesses may survive and even thrive, long-term in the new creative economy.

3 Which I have observed as a fashion educator and curriculum writer, of either elite (in the HE sector) or technical (in the VET sector), designer skills

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GOING ECO, GOING DUTCH: a Local and Closed Loop Textile Production System

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Closed loop, Sustainability, Local production, Design4Recycling, Hemp, Recycled post-consumer cotton.

INTRODUCTION

Consumers, producers and designers are increasingly demanding transparency throughout the fashion and textile supply chain to realize the required reduction of the environmental impact of textiles. Communication between these stakeholders is mandatory in order to accomplish this, but is difficult because of the complexity of the international supply chain. Designing and producing garments is still done in the classic top down approach; innovation in the textile and clothing production chain is necessary to realize the required improvement and make the textile industry sustainable. Innovative designers as well as established companies are looking for sustainable alternatives for conventional raw materials, new production methods and recycling options throughout the whole chain. Collaboration between all stakeholders and workers in the textile production chain is required and despite this understanding, transparent and long-lasting collaboration is not yet common practice. The Dutch textile industry has the knowhow and resources to set up a local and closed loop sustainable textile production system by collaboration with all stakeholders involved.

Textiles fibres can be classified into a number of categories. Widely used is the division between natural fibres and synthetic fibres. The natural fibres can be of vegetable origin, such as cotton and hemp, or of animal origin such as wool and silk. The synthetic fibres can be based on natural raw materials, such as viscose and PLA, or are based on petroleum derivatives. (Luiken, 2015)

A circular economy is one that is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times. (foundation, 2015)

In the project Going Eco, Going Dutch the focus is on the circular use of natural fibres. It is intended to use a combination of locally grown hemp and recycled postconsumer cotton. The mechanical recycling is using discarded garments, which are collected and sorted in The Netherlands.

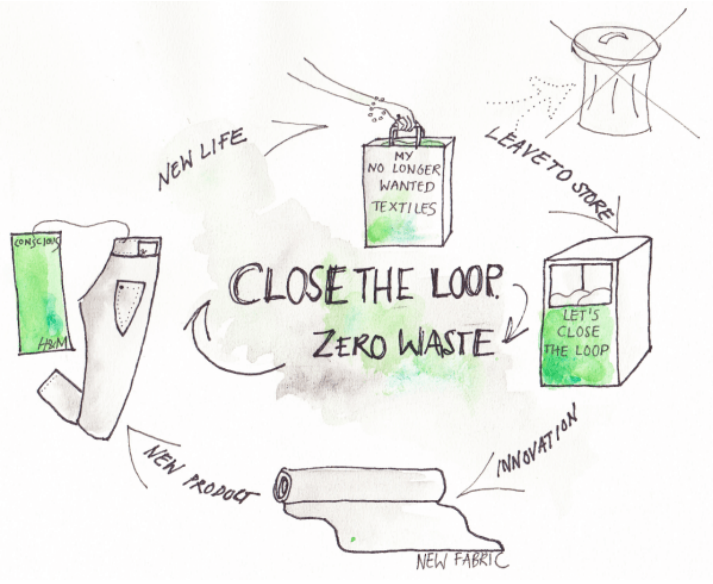

Figure 1. closed loop from waste to product (McGregor, 2015)

The fibers will be locally processed into yarns and be used to produce woven and knitted fabrics by researchers and textile companies within the project Going Eco Going Dutch. It is a two-year project in which the educational institutions ArtEZ University of the Arts and Saxion University of applied sciences are in the lead. In the project consortium different stakeholders from the Dutch textile and fashion industry are working together the realize the circular supply chain. The project has just reached its midterm. In this paper the interim results are presented and an outlook on the expected results at the end of the project is given.

For an overview of the environmental impact of various textile materials see table 1. It shows the environmental impact of a number of widely used textile raw materials, expressed in the energy it requires to produce a kilogram fibres, the influence on global warming (expressed in kg CO2 equivalents) and the amount of water it takes to produce a kg fibre. (http://www.ecocostsvalue.com/EVR/img/Eco- costs2012_V2_LCA_-data_on_products_and_ services_EI_V3_Idemat2014.xlsx). , n.d.)

Table 1. Environmental impact textile fibres

Fibres	Global warming CO_2-eq/kg	Energy MJ/kg	Water use l/kg
Cotton (China)	3,5	51,5	6970
Wool	110	680	1091
Polyester	3,2	89,4	0,013
Polyamide	9,3	122,1	13,944
Viscose (Tencel)	4,1	132,2	20
Mechanical recycled cotton	0,36	6,0	0

Life Cycle Assessment

The Life-cycle assessment (LCA) is a standard tool used to investigate the environmental impacts of all stages of a product's life.

Within the project Going Eco, Going Dutch, the environmental benefits of using recycled textile materials are calculated with the Modint Ecotool (http://avnir.org/documentation/book/LCAconf_bijleveld1_2012_en.pdf). This versatile tool can be used to calculated the impact of the whole product life cycle and parts of it. The main output parameters of the impact calculations are kg CO_2 / kg textile, energy use/kg textile and water use/kg textile. The data used by the Modint Ecotool are mainly based on the Ecoinvent database, which is widely used in LCA calculations, and specific data from literature.

The Modint Ecotool was used to calculate the impact for a number of cellulose-based fabrics. In the calculations the processes were standardized as much as possible, in order to be able to compare the results. Assumptions were made with respect to recycled materials in the pretreatment (no scouring and bleaching of the recycled content) and coloring (no dying or printing of the fabrics containing recycled content, as the recycled materials can be sorted based on their color).

It is clear to see that the blend 50%recycled cotton and 50% hemp is by far the most sustainable, see table 2.

Table 2. Overview impact LCA

	Chines cotton	Organic cotton	Tencel	Rec.cotton / tencel 50/50	Rec.cotton/hemp 50/50
	CO_2-eq (kg/ton)				
Fibre materials	3.520	3.089	4.077	2.200	1.397
Construction	2.429	2.429	2.429	2.429	2.429
Pre-treatment	1.747	1.747	1.747	713	713
Colouring	1.230	1.230	1.230	0	0
Finish	701	701	701	709	709
total	9.628	9.197	10.185	6.051	5.248
	Energy use (MJ/ton)				
Fibre materials	51.500	73.016	132.209	69.516	14.312
Construction	37.788	37.788	37.788	37.788	37.788
Pre-treatment	33.720	33.720	33.720	12.290	12.290
Colouring	24.474	24.474	24.474	0	0
Finish	12.243	12.243	12.243	12.366	12.366
total	159.725	181.241	240.434	131.961	76.756
	Water use (l/ton)				
Fibre materials	6.970.000	2.777.416	20.000	10.000	5.500
Construction	0	0	0	0	0
Pre-treatment	10.000	10.000	10.000	5.163	5.163
Colouring	82.111	82.111	82.111	0	0
Finish	693	693	693	700	700
total	7.062.804	2.870.220	112.804	15.863	11.363

Mechanically recycled textile fibers have a low environmental impact. This was also proven by a study commissioned by Made-By which resulted in the Environmental Benchmark for Fibers". See figure 2 But this does not cover the full range of a brand's sustainability activities or all the impacts associated with garment production. Made-By also developed 'MODE Tracker' this is much more holistic in scope, covering all the key issues for the fashion industry. It offers brands and retailers the ability to communicate across up to eight cube topic areas from People and Product through to Manufacturing, Own Operations, Use and Durability, Packaging and Transport, Product Waste and Transparency. By providing companies with a vehicle for communicating across the full range of impacts, it supports greater transparency within the sector.

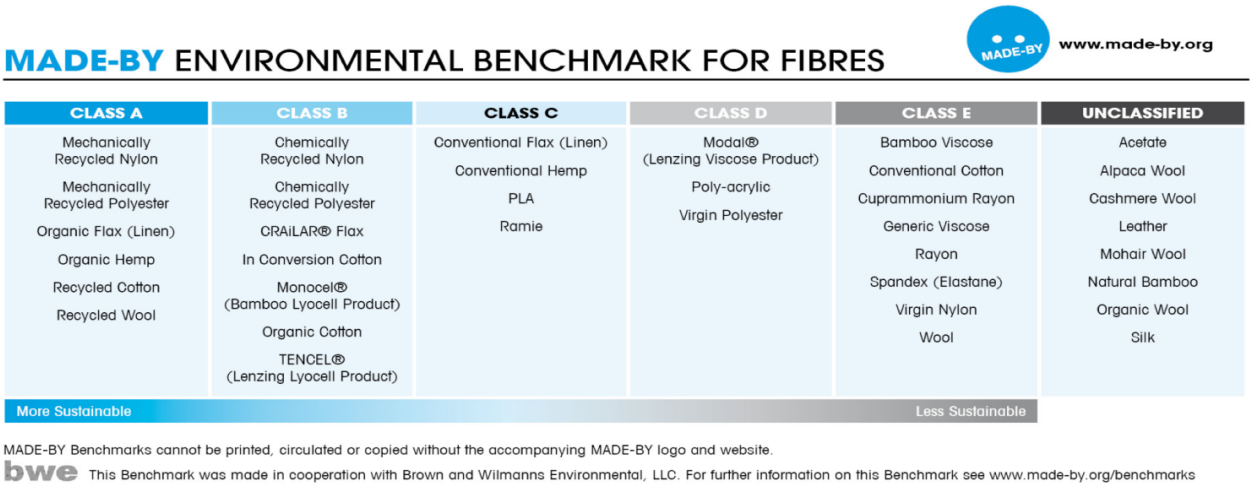

Figure 2. Made-By Environmental Benchmark for fibres (made-by.org/modetracker/scorecards) (http://www.made-by.org/wp-content/uploads/2016/05/MADE-BY_Annual-Report_2015.pdf)

Recycling technology

Textile recycling can be divided into mechanical recycling and chemical recycling. Not all methods are suitable for all fibers. In the Going Eco, Going Dutch- project the focus is on the mechanical recycling. In a mechanical recycling process, the textile waste is cut in bits and pieces and further shredded into loose fibers. The mechanical recycling is hindered by non-textile parts in the garments like buttons, zippers and labels. Designers could think of a way to leave them out of the garments (Design for Recycling) to create a fully recyclable collection. Metal zippers and buttons can cause damages on the carding machines in the pre-spinning process. Nowadays, these non-textile parts have to be removed manually before shredding as not all these parts can be removed during the shredding process.

In general, with textile-recycling landfill or incineration of the textile waste is prevented. The landfill of textile waste has a negative environmental impact, while burning has a small positive effect because a small amount of energy can be recovered. The impact of landfill and incineration of textile waste can be calculated using the Modint Ecotool and differs per type of fiber. Also the textile recycling process has an environmental impact. At mechanical recycling is 2-4 MJ energy used per kg of textiles, but this is low compared with the energy that the textile production costs. (Luiken, 2015)

The use phase has a severe influence on the end product. The more the garment has been washed, tumble dried, the more worn out the fibers will be. This makes recycling more difficult.

Design4recycling, recycling in design

Designers are looking into the 'design for recycling' and 'recycling in design' principles to develop new garments. The focus in this project lies on locally produced hemp fibers and mainly recycled post-consumer cotton fibers. The fast fashion industry creates a lot of textile waste that ends up on landfills where it pollutes the environment. This project examines the potential of textile waste as a valuable renewable source. Sustainable fashion today should consider three key areas: society (which should focus on social equity), the environment (which should focus on ecological stability) and the economy (which focus on economic viability). The challenges for designers is to manage these three facets responsibly and embrace a holistic approach to sustainability. (Gwilt, 2014)

Sustainability is not only to optimize the sustainable cultivation and the processing of the fibres, but also the way to design plays an important role in the whole process. To make the design process more transpar-

ent you have to go deeper into the design for recycling and recycling in design principles. Where design for recycling looks at the thought to design in a way that the produced products can be put in the chain after use. Recycling in design makes maximum use of recycled materials, with the limitations of the used material as a design feature. Ideas and decisions made by designers throughout the development of a collection can have a big impact on its durability. The greatest opportunity to reduce environmental and social impacts occurs through the decisions the designer makes during product conceptualization and the design process.

Designers, producers and retailers have choices make before developing sustainable garments in different topics and possibilities. How to minimize waste? Pre- and postconsumer. Being as efficient as possible. Clothing can be designed in a way that they are multi-functional, garments that are made to last more than one season. Designers can make a selection of appropriate materials such as organic and recycled fibres and fabrics that utilize fewer chemicals from raw materials phase to apparel production before designing. There should also be a selection of appropriate materials that can be recycled/up-cycled or re-purposed and avoid the use of blends that cannot be separated, so the use of materials that are produced with closed-loop systems. The content of most garments are made of blend materials, due to the fact that this is pricewise a cheaper option. In order to optimize the mechanical recycle process, it is an option to design with mono materials. Because blends often contain cellulosic and synthetic fibers and oftentimes, fibers, dyes and finishes of post-consumer waste remains unknown. There is no way to identify the fiber content in garments, therefore, sorting these into mono materials is currently impossible.

Another different approach to improve the recyclability is to make the disassembly of the garment into single components, e.g. by using innovative techniques such as a microwaveable yarn; a short bust of microwave energy is applied to a seam, it breaks at multiple points, allowing the disassembly with an application of minimal force. The thread's tensile strength is rapidly reduced by more than 80% through thermal decomposition, while the fabric remains undamaged. (Blackburn, 2015). To reduce waste before cutting, the patterns must lay in such an efficient way that there is a minimum of fabric loss, in this way pattern drafting increases efficiency and results in cost savings. (Kozlowski, Bardecki, & Searcy, 2012)

Sources such as the Nike "making app' can be useful during the choice of materials.
MAKING is a tool to inspire designers and creators to make better choices in the materials they use. We know that every decision a designer makes in the product creation process has an impact on the environment. But given the range of options that exist, making informed choices can be a challenge. Powered by the Nike Materials Sustainability Index, MAKING provides the information to enable users to make real-time, predictive decisions. (news.nike.com, n.d.)

Furthermore, GOTS certified fabrics can be used. The Global Organic Textile Standard is the worldwide leading textile processing standard for organic fibres, including ecological and social criteria, backed up by independent certification of the entire textile supply chain. These fabrics fulfill certain requirements, such as ethical and chemical ones and are official sustainable. (www.global-standard.org, n.d.)

Materials and methods, development of the yarns

Introduction materials

The quality and properties of the end-product, in this case a yarn, are mostly determined by the quality and properties of the fibers used. Therefore, it is important to start this research with determining the quality of the selected fibers, which are recycled cotton fibers and local hemp fibers. The quality is determined subjectively and by hand. In the industry the mechanical properties of fibers can be determined with an HVI system (Uster, 2016). This was not available during this research, because the system is mostly used in the industry were large numbers of fibers need to be tested. The most important fiber properties which affect the quality of the yarn are the Micronaire (fineness), strength and length (Klein, The Rieter manual of spinning, Volume 1 Technology of short staple spinning, 2014). Upland Strict Low Middling (41) was set as a bench-

mark for the quality of the fibers. This cotton-quality can be seen as the standard in the industry. Table 4 gives an overview of the fibers used for the development of yarns.

Recycled cotton

Recycled cotton fibers are derived from recycled post-consumer jeans. This raw material exists of yarn-ends, short fibers, dust and pollution from metal parts, labels and textile pieces. The length of the fibers is approximately 3-5 mm. The yarn-ends give some length to the raw material but this is not significant for the spinning process, because the longer yarn-ends affect the spinning stability and the look of the yarn. The yarn-ends will be opened a little during the spinning process, resulting in a higher content of longer fibers. Approximately the length of the fibers will be between 5-10 mm. Recycled fibers can best be processed in a blend with longer cellulosic fibers. At the time of this research these fibers were not available, so polyester fibers were used temporary.

Local hemp fibers

Hemp fibers are cultivated in the Netherlands and opened and softened (cottonized) for further processing with the so called steam explosion technology. This is a technological alternative for conventional processing with enzymes and dew retting. As there was an insufficient amount of local hemp fibers available for the spinning experiments, an amount of hemp of Chinese origin was used as well (also as a benchmark for the local produced hemp). Local hemp fibers show a great variation in length from 5-160 mm. The raw material is not completely opened. Conventional (Chinese) hemp fibers have a length of 40 mm and are well opened, soft and bleached. These fibers are comparable to the Upland Cotton Strict Low Middling (41) quality. Local hemp fibers are being blend with polyester for more length and with recycled cotton in order to reach a more sustainable end-product.

Table 4. Overview of fibers used for the development of yarns.

Recycled cotton	Local hemp	Conventional hemp	Polyester
Fiber length: 3-5 mm	Fiber length: 5-160 mm	Fiber length: 40 mm	Fiber length: 45 mm
			

Environmental conditions

Fiber properties are affected by the temperature and air humidity. It influences the strength and elongation of the yarn. For this reason production and quality testing needs to be done under constant environmental conditions (Furter, 2009). According to ISO 139 (NEN, 2005) the perfect temperature is 20°C (±2) with an air humidity of 65% (±4). Depending on the raw material it takes 24-48 hours before the raw material is acclimatized. The spinning mill and the laboratory used in this research do not possess the right equipment to meet these climatic conditions, which can affect the results of the measurements.

Spinning preparation

Before spinning, the fibers are prepared through blending, opening and cleaning. The spinning preparation took place on a picker. In the industry the process of blending, opening and cleaning takes place in a so called Blow room. The quality of the fibers can be decreased up to 50% during the spinning preparation depending on the raw material (Klein, The Rieter Manual of Spinning, 2014).

Different blends with recycled cotton, local hemp, conventional hemp and polyester were selected for experiments. Conventional hemp fibers were replaced by local hemp fibers. Table 5 gives an overview of the different blends.

The right amount of fibers was measured before they were led over the picker. The picker exists of rollers with coarse teeth. This causes the fibers to open and blend properly. It also eliminates some dust and impurities from the raw material. First the raw materials were processed on the picker separately in order to open the fibers properly. Afterwards the raw materials were blended on the picker together in order to create a homogeneous fiber blend suitable for carding. The better the fibers are blended, opened and cleaned during this preparation process, the better the quality of the card sliver and thus the quality of the yarn.

Table 5. Overview of different blends.

Material Experiment	Recycled cotton	Local hemp	Conventional hemp	Polyester
1			100%	
2	70%		30%	
3	33%		33%	33%
4	33%	33%		33%

Carding

Carding is the process of separating and parallelizing individual fibers and combining them into a web. Most cards have the possibility to turn the web directly into a card sliver which is suitable for an open-end rotor spinning machine.

For this research an experimental card was used. This made it difficult to control the process of feeding the fibers into the card and producing an equal web which provides an equal sliver. The web is formed on a large roller with small teeth. In order to produce a card sliver the web needs to come off of the roller and led between two small rollers that press the fibers together and stretches them. From the experiments was learned that the hemp fibers and the recycled cotton fibers are too short to come off of the roller which made it impossible to produce a card sliver. Longer and clean fibers could solve this problem. For that reason polyester fibers, and in the future cellulosic fibers, will be added to the blends.

Spinning process

Ring spinning is still seen as the standard in the industry, but open-end rotor spinning offers a lot of benefits. The production rate is higher, because spinning and winding of the yarn on a cone are combined in one machine. Also the process step of making a roving is eliminated. open-end rotor spinning is mostly suitable for the processing of cotton fibers, but also for polyester/cotton blends, viscose, acryl blends and recycled cotton fibers. Fibers with a length of 10mm to 60mm can be processed on an Open-end rotor spinning machine (Ernst, 2014, p. 61).

For this research spinning experiments were executed on an open-end rotor spinning machine. The input is a card sliver which is separated into individual fibers when entering the spinning box. These fibers are twisted and spun into a yarn through centrifugal force. The twist is one of the most important parameters, because it determines the strength, look and feel of the yarn. The spinning process is influenced by many parameters which need to be adjusted according to the raw material and the desired properties of the yarn. For this research the aim is to produce a yarn which can be processed on current knitting and weaving machines in the industry.

The quality of a yarn is determined by evenness, hairiness, thick and thin places, strength, elongation and yarn count. In this research the focus is on strength and yarn count. The yarn count is given in Nm (metrical

number). This indicates how many km fit into 1 kg of yarn. The strength is tested on a Tenso Lab 5000 according to the following standard: NEN-EN-ISO 2062 - Textiles — Yarns from packages — Determination of single-end breaking force and elongation at break using constant rate of extension (CRE) tester (NEN, 2009). The strength of a yarn is given in cN/tex. This number indicates how much force (cN) is needed to break a yarn of a given yarn count (tex = grams of yarn per km). In consideration with the project partners the minimal yarn count and minimal strength were determined. These numbers are based on experiences of knitting and weaving experts. The minimal values are shown in table 6 Although the elongation also tells something about the quality of the yarn, no minimal value was set for this parameter.

Table 6. Minimal values set to determine the quality of the yarn.

Test	Measuring unit	Minimal value
Yarn count	Nm	15-20
Strength	cN/tex	12-15

After treatments

Improving the quality of the yarn can be done with after treatments. The yarns produced during the experiments were waxed before they were wind up on a cone. The purpose of waxing is to reduce the friction between yarns and between yarns and machine parts which can cause yarn breakage during further processing like knitting. The wax can be washed off after processing.

Double twisting (twinning) can be done after spinning. Two yarns are combined in one new yarn by adding a twist. This results in a thicker and stronger yarn. Double twisted yarns were nog available yet for this research.

Results

The carding experiments resulted in two card slivers suitable for experiments on the open-end rotor spinning machine:

- a blend of 33% recycled cotton/33% conventional hemp/33% polyester
- a blend of 33% recycled cotton/33% local hemp/33% polyester

These card slivers were used for spinning experiments in order to find out if the desired quality could be produced.

Before all spinning experiments the twist, draft, yarn count and sliver count were determined. Based on these numbers the machine settings were set. The first spinning experiment was done with the 33% recycled cotton/33% conventional hemp/33% polyester blend. The card sliver was irregular which caused problems with the spinning stability (yarn breakage during spinning). This resulted in an irregular yarn with a very low strength. Table 7 shows the results of the first spinning experiment. Although no minimal value was set for the elongation, this number was added to the results in order to complete the information on which the conclusions are based.

Table 7. Results of spinning experiment 1.

33% recycled cotton/33% conventional hemp/33% polyester			
Test	Measuring unit	Minimal value	Result
Yarn count	Nm	15-20	18
Strength	cN/tex	12-15	3,3
Elongation	%	-	6,8

The second experiment was done with the 33% recycled cotton/33% local hemp/33% polyester blend. The card sliver is more regular compared to the first experiment which resulted in a better spinning stability and a more regular yarn. But overall the sliver was still quiet irregular and yarn breakage appeared during spinning. This was also caused by the coarse hemp fibers which are difficult to process on the open-end rotor spinning machine. Table 8 shows the results of the second spinning experiment.

Table 8. Results of spinning experiment 2.			
33% recycled cotton/33% local hemp/33% polyester			
Test	Measuring unit	Minimal value	Result
Yarn count	Nm	15-20	20
Strength	cN/tex	12-15	7,0
Elongation	%	-	9,9

In order to deal with the poor spinning stability, the experiment with the 33% recycled cotton/33% local hemp/33% polyester blend was repeated, but with a lower draft. This resulted into a thicker yarn and an improvement of the spinning stability, because there are more fibers in the diameter of the yarn. The coarse hemp fibers seem to stick inside of the rotor (this is where the individual fibers are twisted into a yarn) and spin around the yarn (yarn bindings). This causes thick and irregular places which are more visible in this thicker yarn. Overall this experiment led to a stronger yarn compared to the previous one. Table 9 shows the results of the third spinning experiment.

Table 9. Results of spinning experiment 3.			
33% recycled cotton/33% local hemp/33% polyester			
Test	Measuring unit	Minimal value	Result
Yarn count	Nm	15-20	14
Strength	cN/tex	12-15	9,2
Elongation	%	-	9,7

Because the project Going Eco, Going Dutch is still an ongoing project there are new developments concerning the yarns. At this point a new yarn is spun with the content of 28% recycled jeans, 28% hemp and 44% viscose, the yarns have yet to be tested.

Conclusion

The production process from fiber to yarn was being examined for blends of recycled cotton and local hemp. The aim was to produce different yarns which are suitable for further processing on conventional knitting and weaving machines.

The most important fiber qualities are Micronaire (fineness), strength and length. These fiber properties and the spinning preparation have a great influence on the quality of the yarn. The best sliver is maintained after the fibers are properly opened and blended on a picker. The fiber preparation takes place in an experimental environment. Therefore, it was difficult to control the process and produce an evenly and reproducible sliver. This directly influenced the spinning stability and the yarn quality.

Three yarns with different compositions and yarn counts were produced on an open-end rotor spinning machine. The quality of the yarns was determined by strength and yarn count. The first yarn was a blend of recycled cotton, conventional (Chinese) hemp and polyester which had the right yarn count, but only had a strength of 3,3 cN/tex. The second yarn with recycled cotton, local hemp and polyester showed better results with a strength of 7,0 cN/tex, but still was not strong enough. The third yarn had the same composition as the second, but was spun with a lower draft. The effect was a thicker and stronger yarn, 9,2 cN/tex. Still the three yarns do not yet suit the minimal requirements.

Textile waste needed for sustainable yarn development is widely available. However, the fibers of the recycled content are short and the local hemp fibers used in this project are at this time still too short and there is limited availability. When developing a quality yarn, a blend of different kind of fibres is needed. The produced yarns are irregular: designers could use this aspect as an advantage and unique selling point instead of a disadvantage. Overall local hemp is difficult to spin, the fibres are too hard and woody.

Different fabrics are produced with a quality sufficient for non-demanding fashion applications. There is no additional dyeing needed. See figure 3

The role of designers is very important in the sustainable fashion industry. Design for recycling and the recycling in design principles are demonstrated in different kind of garments, the outcomes of the LCA are very favourable and underpins by the environmental footprint.

Figure 3. produced products

Further developments

Further development of the quality of the raw materials is necessary. As said before, the quality of the fibers determines the quality of the end-product. Suppliers of local hemp fibers and recycled cotton fibers need to optimize their materials to reach a quality which is comparable to standard fibers. Furthermore, the optimal blend of the fibers needs to be found. This requires new experiments for spinning preparation and spinning.

Design for recycling and the recycling in design principles must be further developed and designers must be aware of the necessity of it. In the future it is important to implement these results for a more sustainable textile industry.

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All Fashion Is Local: Assessing the Needs of Fashion and Textile Startups in an Era of Global Fashion Dissonance

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INTRODUCTION

Students and educators who study the global fashion complex understand that powerful multinational organizations and institutions support and drive the global value supply chain in the design, product development, production, marketing and distribution processes. Godart (2014) argues that fashion has an oligarchic power structure which is "rarely questioned" (p.40), and which emerged in the twentieth century based on geographical centers of historic significance in both fashion and textiles. This paper reports on a phenomenon which is not conforming to this traditional power structure; a thriving local entrepreneurial community where fashion is growing in importance alongside existing start-up technology and service industries. This entrepreneurial community includes a variety of participants ranging from emerging designers with college degrees who are not interested in working for large corporations and want control of creative and business decisions; to others with no background in fashion, but with creative ideas, business experience, knowledge of the market, and existing business networks.

The researchers believe that this type of scenario is playing out across the United States, with varying degrees of success, as witnessed by the growth of fashion incubators which have recently emerged and are providing support to startups.

Whether or not an entrepreneurial fashion designer is formally trained, the process of developing products and producing them in low numbers of units typically needed for a start-up is challenging. Globally and locally, the fashion and textile supply chain is complex and involves a diverse array of partners and processes. Very few full-package manufacturers exist to help the novice entrepreneur develop and realize a product which is consumer-ready, and can be produced in relatively small lots. This complexity creates an elongated timeframe for product development and production, involving wasted time and resources. This scenario is not necessarily experienced in the traditional tech entrepreneurial model where a laptop, chair and table is generally all that is needed, or in the corporate fashion world, with easy access to global resources and capital.

The "local" and "maker" cultures which have sprung up around the United States have assisted in prompting the development of a network of support systems such as incubators to assist novice fashion entrepreneurs, for the most part in large urban areas. Etsy, the grand dame of the maker movement, and the "place to buy and sell all things handmade", now includes nurturing of sellers with online assistance with a manufacturer database where designers can find production partners and a wholesaler section where retail buyers can connect with independent designers (Etsy.com, 2016).

The first author's community activities of working with local fashion start-ups was the impetus behind this study. Recognizing that the needs of these types of companies are disparate because of the wide array of product categories and the different available resources, but acknowledging the potential of these local ventures to disrupt traditional large scale fashion networks, the researchers were interested in finding out what

resources might be needed to develop products. The geographic area selected was a centrally-located mid-Atlantic state capital region of the United States, with a population of just over two million people. The region has been a hub for technology start-ups for a number of years, but has also recently begun to recognize the value of the creative class and is actively increasing its appeal by adding amenities such as maker-spaces, co-working spaces, and a thriving entertainment district, all of which complement and encourage traditional creative classes (Perry, 2011). The core participants of the study were a group of eight local fashion entrepreneurs with their base in this region. A focus group was used to collect data, using guided questions and open discussion. Transcript data were sorted, coded and analyzed to help determine what resources might be lacking, and where situations could be further developed. Knowledge of the types of resources that are needed to help fashion entrepreneurs grow their businesses will benefit local industry and should interest the entrepreneurial community and local economic development agencies.

Literature Review

The geography of fashion. Total global apparel exports in 2014 were over $483 billion (IAF, 2016), ranking 11th behind products such as food, chemicals, and petroleum. China is by far the largest growing exporter of apparel products, whereas Viet Nam is the fastest growing, demonstrating that the hub of manufacturing is truly entrenched in Central and Southeast Asia. The world's largest apparel markets, are the United States and China (both around $2.5 billion, with Germany as the closest competitor at $734 million). The country with the highest spending per capita on apparel is the United Arab Emirates, at $1,600 US$ annually, followed by the Northern and Western European countries and Hong Kong (IAF, 2016). These statistics serve to demonstrate the complex network of the apparel production and consumption industry. In addition, there are traditional established centers which constitute the "face" of fashion, and which retain importance while other aspects of the industry shift with economic and political changes. These centers – Paris, London, New York and Milan – the so-called top-tier of fashion, were founded on infrastructures historically designed to meet the local and immediate needs of designers, manufacturers and consumers. All related and support industries were concentrated in short distance from each other. These cities have maintained their strategic marketing power over the global industry, despite losing their manufacturing and developmental power base (Godart, 2014). Their strength is in the staging and production of global fashion weeks covered by the international press.

Fashion entrepreneurship. Fashion businesses exist as large, medium and small companies. Due to their resources, the larger firms tend to be more successful at market penetration. Despite the globalization and scaling of the industry, the number of smaller fashion companies in the U.S. is rising and many are beginning in local markets. Smaller companies have increasing flexibility to innovate products - innovation is a driving force in the U.S. fashion market. In addition, the growth of internet retailing and e-commerce is providing an opportunity for new businesses to reach consumers, without the need for a brick-and-mortar retail path (Euromonitor, 2015).

Small-scale startup companies are typically linked with entrepreneurs, who develop and manage enterprises with elevated levels of risk and reward (Nelson, 2012). There are documented societal benefits from the creativity and risk-taking of entrepreneurs and typically, entrepreneurs can find a void in a market and fill it more rapidly than large corporations due to flexibility and agility. However, many novice designers find breaking into the fashion industry difficult and capital-intensive (Shah, 2013). The fashion field presents challenges for the novice entrepreneur due to the complexity of products and supply chain, and the dominance of global businesses with economies of scale as the rule. Students fresh out of college, or those new to fashion and textiles, may not have had the exposure to business practices, marketing and problem-solving skills in a way that would benefit their new company (Bortolot, 2015; Harvey, 2013). According to Harvey (2013) fashion entrepreneurs have the technical skills and knowledge to create their products, but lack the business know-how to support their business. In particular, the product development process in the fashion industry is complex, time-consuming and costly. The types of technical skills and equipment required

for the development of fashion products include items such as cutting equipment, industrial sewing machines, drafting space and equipment, knitting equipment, CAD software, etc., which require space and investment unavailable to many independent designers (Beckett, 2012).

Fashion hubs or incubators. To encourage the growth of fashion entrepreneurship in the United States, there has been an increase in the number of hubs or incubators, which help business growth, typically with minimized risk (Dilts and Hackett, 2004). As well as being catalysts for innovation and disruptive change within industries, these hubs drive local economic development and help stimulate local economic growth. Many are non-profit, funded by local government and/or local academic drivers. Clients are typically entrepreneurs looking for a "safe" place for experimentation, growth and networking at a critical stage of their business formation. Within the confines of a hub membership, entrepreneurs can obtain valuable skills and resources, network with others, and secure investment to grow their business.

Many hubs begin with sets of goals and objectives, driven by mission and business model. The creative field of fashion can vary greatly not only from traditional business practice but also within product categories, thus presenting a unique set of needs and considerations for achieving success. The first fashion "incubator" was the Toronto Fashion Incubator, established in Canada in 1987 (TFI, 2016). TFI's model has been adopted internationally. It provides shared workspace, in–house design studios, mentoring, classes, marketing assistance, trend and business resources as well as market leads. It was founded by the City of Toronto to provide support for Canada's fashion designers and entrepreneurs, and is now a successful non-profit business, whose model has been copied around the world. In addition to local government support, fashion incubators have been established through partnerships with academic institutions, such as the Brooklyn Fashion and Design Accelerator (with Pratt Institute); and with large industry partners, such as the (Washington) DC Fashion Incubator (with Macy's). As of the time of writing, there are currently 28 fashion incubators around the United States (see Appendix A), up from 22 in 2015. Success of these incubators is difficult to determine, as each has its own way of tracking success. According to the National Business Incubation Association, about 87% of "graduates" from incubators are still in business (Lee, 2015). In addition, the geographic location of these hubs is key. Areas that contain clusters of creative people, with diversity, access to amenities and a tolerant atmosphere, tend to flourish (Florida, 2002). As a result, the majority are located in urban areas.

In spite of the growing support of incubators and business hubs to help entrepreneurial growth, there are still many barriers to success for local fashion startups. Ertekin and Atik (2015), outlined the following as legitimate barriers to acceptance of small fashion companies seeking to provide an alternative sustainable system to fashion: lack of consumer awareness; rapid globalization and a push for macro-economic growth; lack of infrastructure; lack of knowledge, skills and awareness of the alternate system by the rest of the industry. They concluded that educational systems and related activities play a critical role in increasing awareness and knowledge of any alternative challenge to the dominant system.

Despite the barriers which can curtail the success for local industry and smaller companies, there is evidence of some determinants that could assist in success. One of these is the re-emergence of local making of products. Geographical impact and location of an industry has always been important, as outlined previously in this paper, and fashion is no exception. Godart (2014) argues that successful fashion centers have in common partnerships and coalitions between industry, fashion and politics. These commonalities also extend to other industries, for example Paris, which is not only the traditional capital of fashion, but also cuisine. Technology companies also tend to group together in areas where the infrastructure is right for related industries to exist (Silicon Valley, CA). In spite of the dominance of global fashion weeks by the Big Four cities: London, Paris, Milan, New York, other cities are holding high profile fashion shows to compete on a more regional level. In 2016, there have been 51 international fashion weeks so far, open to the industry and press only (europaregina.eu, 2016).

The availability of skilled labor in an area is another determinant towards potential success. Many startups flourish in areas where the fashion and/or textile industries have lost jobs to offshore enterprises, but retain

a cohort of available skilled workers. Higher educational systems in close proximity provide resources, not only in intellectual capital, but also in small business and manufacturing development. Institutions which provide fashion-related degrees can guarantee a steady stream of individuals looking to break into the market. For example, the Brooklyn Fashion and Design Accelerator benefits from having Pratt Institute, Parsons New School of Design and the Fashion Institute of Technology in close proximity.

Fashion is not alone in how local start-ups define success and find a space in the system. Hauge & Hracs (2010) found positive connections between independent music and fashion design in the way that new technology and distribution networks have impacted the way that the two industries complement each other in large urban sectors. In a study of the local music industry in two large Northern towns in England, Brown, O'Connor and Cohen (2000) found that, despite local networks and creative talent, the local music industry is not necessarily secure. From the perspective of the global music industry, the local scene is a "feeder" for the dominant geographical player in England – London; which provides little investment to help develop talent.

In summary, the literature shows that despite the established infrastructure of the global fashion industry, local and national stakeholders can help raise small fashion companies to a place in a new evolutionary system (Godart (2014) suggests a fashion polyarchy). The global value chain, where design, production, marketing and buying are in disparate locations can be reworked as a sustainable system for small companies, especially those specializing in sustainable, sensorial and emotional products (Ertekin et al., 2015). Barriers exist, such as lack of consumer awareness; global desire for large-scale economic growth; lack of infrastructure, knowledge, skills and resources, but some determinants are in place for localized hubs to succeed, in places where educational systems, historical manufacturing centers with available labor, and local economic development support can help drive the local fashion economy.

Methodology

A review of literature uncovered little research into the specific needs of fashion entrepreneurs starting at a local level. An exploratory focus group was selected as an effective means of collecting data to begin exploring the phenomenon. Focus groups are widely used in fashion consumer research, typically to discover more about consumer beliefs and attitudes related to particular issues in the industry. Joergens (2006) used focus groups of consumers in two countries, together with follow-up questionnaires, to elicit consumer beliefs and attitudes towards ethical issues in the fashion industry, gaining a richer understanding of their needs.

Focus group participants consisted of a convenience sample of entrepreneurs who were in the process of starting a fashion-related business or had been in business for less than five years. The participants had to be working within the local geographical area, which was defined as a tri-city geographical area in a roughly triangular configuration with a population of approximately two million people (Population Estimates, 2013). The potential participants came from a list of local entrepreneurs who had been in contact with the principal investigator as a community outreach fellow at a local university. They comprised individuals who were designers, product developers and retailers, or a combination of the above. Twelve local entrepreneurs were contacted via email invitation, and eight confirmed attendance. Institutional Review Board procedures for Human Subjects research procedures were followed throughout the investigation.

The geographic area was selected because it retains some parallels with the fashion centers discussed in the literature; namely, strong heritage in the textile industry, nationally-ranked research universities, thriving local economic development systems, healthy start-up community, and a local fashion success story which has emerged as a leading aspirational and mythic brand for local designers.

Four questions were developed to guide the flow of the focus group: an *opening* question, two *transition* questions, and an ending question. The opening question (what are your business goals?) was designed to "break the ice" in the group, to introduce everyone to each other, and to identify the types of business in

which each entrepreneur participated. The transition questions focused on the specifics of the local fashion entrepreneurs' business (who is your market? do you have challenges with industry connections and networking?) The ending question related to needs perceived as important in a product development hub.

A protocol was written to guide the flow of the focus group. An informed consent statement and signature form was provided to the participants so they could make an informed choice as to their participation and to document their decision to participate. The session lasted for one and a half hours. Participants received a boxed lunch and a $25 gift certificate in compensation. The questions were asked one by one, and each participant responded in order progressing around the table. Occasionally discussion commenced based on one participant's response, however, the roundtable response was continuous for the duration of the session. The focus group was audiotaped for purposes of transcription and accuracy of reporting. Some key points for summary to each question was written on a whiteboard so that participants could remember items that had already been discussed.

The taped interview MP3 file was imported into QSR Nvivo then transcribed. The transcript was prepared by splitting into sections by question. Then prepositions and personal pronouns were coded as stop words, to remove them from analysis. Following this preparation, the transcript for each question was analyzed and coded based on a word frequency query conducted by NVivo.

The word frequency query enabled the researcher to uncover the most important themes that occurred in each response and also to see those themes in context.

Results

Four questions were asked consecutively during the focus group session:

1. What are your goals?
2. Who is your target market?
3. How do you handle networking and industry connections?
4. What type of resources would you like to see in a fashion & textile incubator?

For the first question, the transcript was analyzed and responses were coded as key themes mentioned by participants as follows:

Table 1. Key themes emerging from focus group participants' response to Question #1.

Affordability	Local
Change	Manufacturing
Collaboration	Mentoring
Communication	Promoting jobs
Community	Relationships
Creation	Resources
Education	Scaling
Growth	Storytelling

The goal of **affordability** related to processes, as well as consumers. The goal of **change** was mentioned in terms of changing the current system of the fashion supply chain. **Collaboration w**as a goal in working together and sharing space, in addition to sharing resources. Participants spoke of isolation, and one mentioned that she had been looking forward to the focus group "for a month just to hang out" with like-mind-

ed entrepreneurs. **Communication** was a goal related to key players in the supply chain and also with each other. It was apparent that communication

problems with the supply chain has been frustrating, due to distance from manufacturers and lack of traction in business. Along with this, the idea of **community** was considered extremely important for entrepreneurs to thrive and share ideas. The concept of **creation** was frequently discussed, in terms of creating product, creating money, and creating relationships among the community of entrepreneurs. **Education** was seen as a goal for consumers about the small-scale, local manufacturer, as well as fair-trade apparel. **Growth** was a goal for scaling existing businesses financially. The goal of **locality** was also frequently mentioned. This took on many meanings, including the need for local resources; the readiness of the local community for making, selling and buying locally-sourced goods; keeping the supply chain local, and having a local space for entrepreneurs to get together and share. **Manufacturing** was a goal that has been a source of frustration, and has involved much wasted time and money trying to get product made. However, three participants had secured reliable manufacturing in the U.S. and are pleased with their choices. All three had been connected via an industry partner. Others related having to travel constantly and meet people face-to-face before they agreed to take on their business. The goal of **mentoring** was mentioned several times, and most had a mentor with whom they had a productive relationship. They encouraged others to get a mentor if they didn't have one. **Promoting jobs** to foster the local economic ecosystem and "put people back to work" was a goal for some. Building **Relationships** was a key goal. All agreed that the face-to-face relationship has worked best, however, personality is crucial, and they would like to have workshops on how to develop these relationships, as well as negotiating tools. Following on from this, the goal of finding and sharing **resources** was extremely important. Participants spoke of not having access to resources, or having to work from a distance. Most agreed that having a "one-stop shop" for the resources they needed would be a welcome option. All agreed that finding resources as a small entrepreneur is a legitimate struggle and deterrent to success. The issue of **scaling** was continually raised. "My goal is to scale and let others scale", was one of the comments raised in the group. Others did not want to scale up their businesses, while one person mentioned the need for large, mid- and small-scale manufacturing in the U.S. so that all types of businesses could find a contractor. **Storytelling** was a goal with different meanings. First, participants felt that the story of their process needs to be told to potential customers, and that there is a valid interest in this. Also, the story of fair trade and local trade is important to consumers, and the local maker community is not doing a great job at telling this story to the greater community and media.

Responses to the question of target market identification showed that most of the participants found it difficult to identify one particular customer but agreed that multiple demographic profiles existed. The commonality was that customers tended to be people who were interested and invested in the value of the designers work and story. Customers also value quality and respect individual product differentiation. Participants did not seem to spend time on traditional market research, rather they secured relevant information by talking to people, described as an "organic process". This was especially true for one of the most successful companies, which offers products to a very specific target market, about which there is very little research or general knowledge since the group is very "protective" about sharing information.

The third question regarding industry connections and networking elicited a variety of responses. Participants mentioned the benefit of having industry mentors. They deemed finding a mentor as being instrumental to their entrepreneurship journey. Participants all agreed that making industry connections was as difficult as the supply chain is complex. An experience shared was where participants were "handed off" from one potential vendor to another in search for a process or product. Participants agreed that many connections were made by sheer luck, and by talking to people extensively by phone, visiting factories, and establishing a rapport. Networking was seen as challenging due to the complexity of the industry, but also due to personality. Many designers are introverted, and find it difficult to pick up the phone and reach out to multiple external sources. It was agreed that staying connected with contacts was of the utmost impor-

tance. In addition, informal networking is seen as very important. Retailers discussed networking on the sales floor, and simply talking to people at events "can open up Rolodexes".

The final question dealt with desired resources that participants would like to see offered in a facility that incubated local designers' products. There was broad need for assistance with **branding** of company and products. The participants represented diversity of brands and products, but most participants cannot build and grow their brands beyond their current state of existence. They would like to be able to consult with experts regarding their business, especially to determine key information and readiness for production. Participants felt that **location** of resources was extremely important. There was agreement that having resources that are local is important, not only from a logistics viewpoint but also in terms of pride in jobs being created locally and developing the regional identity. Participants agreed, that through their own networks, there is great opportunity for a robust local "scene" for fashion and textiles entrepreneurs. As a resource, a local **market** center could be beneficial to the community. One participant spoke of "doing these little markets; pop-up shops all year long", but what is needed is serious interface with retail buyers. Related to this would be training to prepare for going to market. They feel that they are not prepared to talk to big national buyers, especially from a financial negotiations standpoint. A market center would also serve as a facility for fashion shows and special events. **Manufacturing** was an important need. One participant is doing all her manufacturing in East Africa, as this is part of her brand story. Another is manufacturing on the U.S. West Coast because she finds it easier to work with the facilities. All agreed that manufacturing small and large product runs has been their biggest headache. They feel that they have wasted time and money trying to find a contractor to do work for them. They feel that collaboration, especially sharing of resources and contacts, would help with this problem. One of the biggest problems is the sourcing of materials – not only in finding, but needing to discuss fabric choices with people who have used a particular fabric, and would be willing to share their experiences. One participant has hired a production manager who lives in New York City, at a high cost, but she has accepted the benefits of hiring someone with contacts. There was discussion related to fit **models.** Few of the participants used fit models, or knew how to find them. One used her friends, and then reimbursed them with samples. Another product development resource that is needed is good **patternmaking.** Most participants know how to make a basic pattern, but not for production. There was much talk about having a resource to streamline the entire product development **process, including cut and sew**, and making if more **affordable**. The wasted time spent in going in different directions was also seen as wasted capital. In summary, for product development to be effective for this group, small scale **full package production** is needed.

Table 2. Resources desired by entrepreneurs for a fashion product development incubator by type and attribute.

Types of resource	Attributes of resource
Branding	Location
Local market center	Affordability
Fit Models	Close consumer interaction
Manufacturing	
Patternmaking and grading	
Small run cut and sew	

Discussion

The goals of the participants of this focus group were multiple and diverse, but there were recurring themes related to collaboration, community, relationships and sharing; changing the system to be more sustainable for start-ups; creating manufacturing jobs, and promoting growth, while connecting with customers

through storytelling. Some of these themes are common to all fashion companies, such as job promotion and financial growth. In terms of consumer research, it was apparent from responses to the second question that little structured research is being carried out, rather it is more informal process. Networking, contacts with established industry partners, and building relationships all surfaced as challenging issues for the entrepreneurs, which was also very much an informal and hit-or-miss process. Finally, the prospect of a local incubator, focusing entirely on the development of products was welcomed with enthusiasm, and multiple suggestions for programming and resources, including full-package development for small businesses, plus resources outside of the scope of product development, such as branding and marketing, and a market center for designer/buyer interaction.

Local sourcing was an important recurring theme for this group. Even though sustainability was not mentioned, the net result of local sourcing and production would generate a low net carbon footprint for these companies, and fit in with the trend to local production and consumption of like-minded industries. Over the past four decades the fashion industry has built vast global networks, dominating many countries' economies and providing low wage labor so that multinational corporations can maintain profit margins while providing cheap products to consumers. Local sourcing also lends itself well to the Quick Response model, where inventory is kept low thus minimizing waste and market demand and supply is better served. Choi (2013) describes a local carbon footprint offset taxation scheme, which encourages retailers to source locally, and reduces financial risk for these retailers.

Another important theme throughout the focus group was networking and mentoring, and a feeling of being isolated. This supports Shultz's (2015) findings that independent makers have to promote, produce and distribute their creative output on their own, without the traditional intermediaries of the global fashion network. In spite of the challenges presented by this workload, Shultz found that they form professional support networks to assist in these tasks and at the same time make use of social media to increase their visibility. In addition, Wenting, Atzema and Frenken (2011), found that Dutch fashion design entrepreneurs consider that urban amenities of the Amsterdam cluster to be more important in selecting their location than the agglomeration economies (available supportive industries) due to the superior networking opportunities afforded by the urban cluster. In order for these entrepreneurs to be successful, the established methods of networking need to be challenged in a way that includes this new generation of local fashion pioneers, using technology for social media where necessary but also incorporating sharing of experiences on a personal level.

Conclusions & Recommendations

The success of fashion brands in any geographic area is dependent upon a variety of factors. This study was undertaken to begin a conversation related to the impact that small fashion entrepreneurs can make on the industry and at what level. In addition, what resources they need to be successful. Given the location of the research study, and the presence of history, technology, skilled labor, educational institutions, and proactive economic development, it is possible that the resources needed by these entrepreneurs can be delivered. The recommendations for actualizing these resources are to build on what the entrepreneurs have asked for in conjunction with what is already known about the establishment and foundation of traditional fashion centers. Future research must include a large scale survey-based study across the U.S. to determine the veracity of these findings. In addition, researching the entrepreneurs in a longitudinal study would assist in determining whether the issues raised in this study at the start of their journey would continue to be pertinent after some time in business.

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Appendix A. Fashion Incubators in North America as of December 30, 2016

Name	Website	Location
Fashion Incubator San Francisco at Macy's Union Square	http://www.fashionincubatorsf.org	San Francisco, CA
SF Fashion Lab	http://sffashionlab.org	San Francisco, CA

Philadelphia Fashion Incubator	http://www.philadelphiafashionincubator.com	Philadelphia, PA
Chicago Fashion Incubator at Macy's on State Street	http://www.chicagofashionincubator.org	Chicago, IL
DC Fashion Incubators @ Macy's	http://www.dcfashionfoundation.org	District of Columbia
Manufacture New York	http://manufactureny.org	New York, NY
CFDA Fashion Incubator	https://cfda.com	New York, NY
Brooklyn Fashion and Design Accelerator	https://bkaccelerator.com	New York, NY
Seattle Fashion Incubator	http://seattlefashionincubator.org	Seattle, WA
Nineteenth Amendment	https://www.nineteenthamendment.com	New York, NY
Detroit Garment Group	http://www.detroitgarmentgroup.org	Detroit, MI
The Runway- Lansing	http://www.runwaylansing.com/	Lasing, MI
Fashion Business Incorporated	https://fashionbizinc.org/	Los Angeles, CA
Factory Girls ATL	http://www.factorygirlsatl.com/	Atlanta, GA
Atlanta Fashion Incubator	http://www.atlantafashionincubator.com/	Atlanta, GA
HIFI-Hawaii Fashion Incubator	http://www.hawaiifashion.org/	Honolulu, HI
Saint Louis Fashion Fund	https://saintlouisfashionfund.org/	Saint Louis, MO
Stitch Factory	http://www.stitchfactory.com/Las	Las Vegas, NV
DE FI Dayton Emerging Fashion Incubators	http://www.daytonemergingfashionincubator .com/	Dayton, OH
Denver Design Incubator	http://www.denverdesignincubator.com/	Denver, CO
MKE Fashion Incubator	http://www.mkefashionincubator.com/	Milwaukee, WI
Nashville Fashion Alliance	https://www.nashvillefashionalliance.com/	Nashville, TN
Fashion-Incubator	http://fashion-incubator.com/	Albuquerque, NM
Baltimore Fashion Alliance	https://baltimorefashionalliance.wordpress.c om/	Baltimore, MD
Toronto Fashion Incubator	http://www.fashionincubator.com	Toronto, ON, Canada
The Setsuné Fashion Incubator	http://setsuneincubator.com	Toronto, ON, Canada
The Joe Fresh Centre for Fashion Innovation	http://www.joefreshcentre.com/	Toronto, ON, Canada
Nova Fashion Incubator	http://www.novafashionincubator.ca	Halifax, NS, Canada

On Paradigm Shifts and Industrial Revolutions: Tracing Prevalent Dressmaking Practices and Apparel Production Systems in the Netherlands and Northwest Europe (1850-2016).

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INTRODUCTION

The manufacture of customized products on demand has been growing during the last decades, when technological developments in communications coupled with digitally- controlled manufacture machines - machines with high degrees of automation that make possible to produce more flexibly and relatively fast (Boradkar 2010, pp.115–119). In Western Europe, these developments have been supported by public policy aiming at reviving the local industries based on service and technology-intensive production. The German government, for example, has promoted the concept of "Industry 4.0" or Fourth Industrial Revolution to encourage emerging uses of cyber-physical systems in industrial settings. The term makes reference to previous significant technological developments such as the introduction of mechanical production facilities with the help of water and steam power (18th century, 1st Industrial Revolution), the introduction of division of labour and mass production with the help of electrical energy (19th century, 2nd Industrial Revolution), and the use of electronic and IT systems to further automate production (1960s, 3rd Industrial Revolution) (Deloitte 2014). In the same line, the Dutch policy promotes the development of "Smart Industries", which have

> *"a high degree of flexibility in production, in terms of product needs (specifications, quality, design), volume (what is needed), timing (when it is needed), resource efficiency and cost (what is required), being able to (fine) tune to customer needs and make use of the entire supply chain for value creation. It is enabled by a network-centric approach, making use of the value of information, driven by ICT and the latest available proven manufacturing techniques" (Dutch Ministry of Economic Affairs 2014).*

Within the sector of fashion, these concepts have typically materialized in online services for customized products that are manufactured based on direct consumer demand. Showcases of this format often include the London based firm Unmade. Having developed from a creative start-up (Knyttan) where customers could walk in the store and use an interactive platform to create their own knitted sweaters, the current Unmade online store provides an overview of customizable designs for knitted sweaters, T-shirts and scarfs (fig. 1). The choices provided to customers include size, model, colour and pattern, which are selected through digital visualizations and knitted on-demand by a numerically controlled knitting machine after the order is completed (Unmade n.d.).

This format has not only developed within the realm of creative start-ups; giants of sportswear such as Nike and Adidas have diversified their services by implementing customization systems as part of their offer. Through online platforms NIKEiD and miadidas, consumers can design personal sport shoes by combining a variety of models, colours, shapes, and sizes online. The resulting design is produced on-demand and shipped within 3 to 5 weeks (NIKEiD n.d.; miadidas n.d.). Moreover, governments and knowledge institutions are facilitating networks of local companies that can deliver such services by working together. European Union-funded projects such as CoreNet (Customer-oriented and eco- friendly networks for healthy fashionable goods) and "From roll to bag" are first steps promoting a transition from traditional industrial formats to a new model in which production batches are smaller and production lines more flexible (CoreNet n.d.; Fromrolltobag n.d.).

Both public policy supporting these developments and scholars studying emerging models for flexible production on demand stress its benefits in opposition to mass production. The discourse of Industry 4.0 or Smart Industry is usually based on the argument that new technologies are to some extent enabling a return to the values of pre-industrial societies and tackling the problems brought about by the first and second industrial revolutions (see e.g. Boradkar 2010, p.124). "Traditional" industrial models are accused of having distanced consumers and producers, enabling overconsumption and overproduction. Customized production, on the other hand, is promoted as a possible solution to those challenges: a more sustainable system in which the needs and desires of consumers are directly translated into manufactured products rather than products being created first and then pushed into the market (see e.g. Black et al. 2009; Niinimäki 2009). The vision is that by enabling a "smarter industry" we can solve some problems of "mass production" by, for example, moving manufacture facilities nearer to the consumer and diminishing industrial waste.

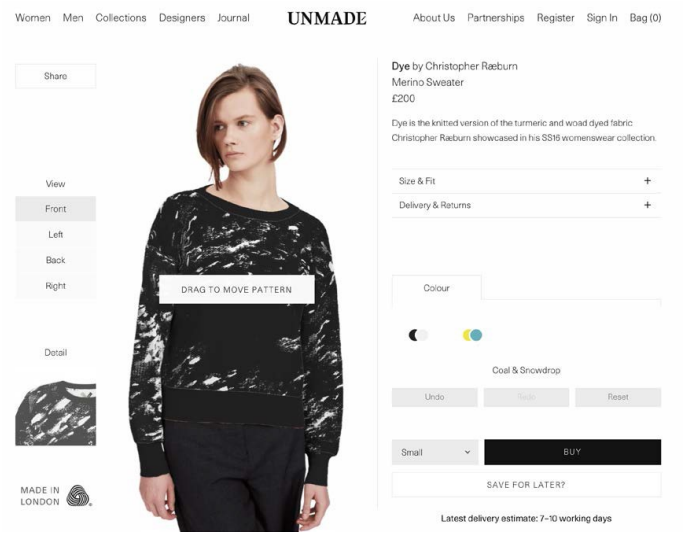


Figure 1. Unmade's online store including customization options (Unmade n.d.)

Figure 2 summarizes historical perspectives of industrial substitution, stressing the relationship between apparel pre-industrial and emerging flexible systems. According to this historical vision, the process of industrialization dismantled crafts-based dressmaking practices. Therefore, by enabling new advantageous ways of apparel production we may replace traditional mass manufacture with more sustainable production systems. Some common elements be-

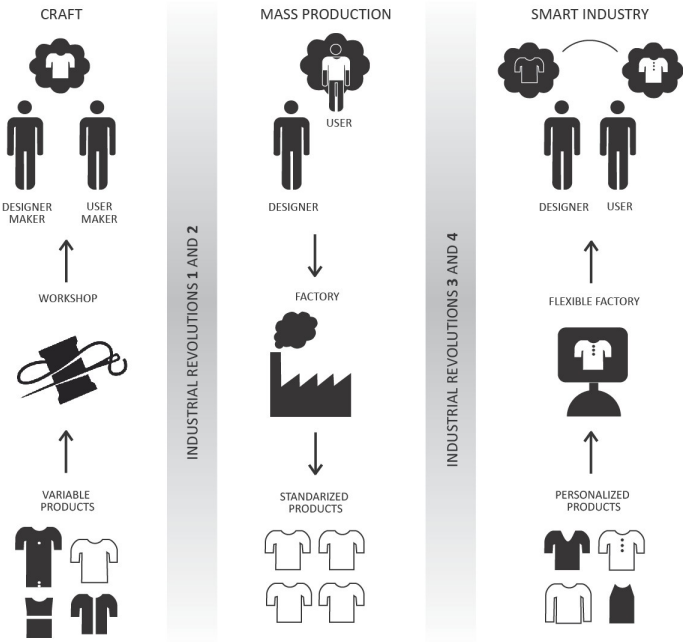


Figure 2. Historical overview of production systems stressing the role of "industrial revolutions" as enablers of industrial substitution.

tween the first and the last column include the active participation of the user in the configuration of the product (in mass production the user is involved only in intention, through the figure of the professional designer) and the flexibility of the production process based on demand (note a difference in the orientation of the arrows in the illustration), both leading to variable results. If understood chronologically, from left to right, the message is that -although with more efficiency and sophistication- present forms of industrialization are somehow bringing back the advantages of craft.

This article contests this historical view, claiming that it is based solely on the development of production systems. In order to assemble a more comprehensive historical perspective, we should include considerations of mediation and consumption of garments in addition to production (Lees-Maffei 2009). As it will be discussed in the following sections, the development of new ways of producing and consuming in the apparel sector has been incremental rather than substitutive. In other words, the popularization of new models has not led the old ones to disappearance. Production and consumption rates have grown together with new systems and emerging models have complemented rather than substituted old ones. From this perspective, notions such as "revolution" or "paradigm shift" in the sector are contested on the bases of historical research. A review of secondary sources at a European level and the analysis of statistical data from the Netherlands and the city of Amsterdam points out that transformations in the apparel sector during the process of industrialization were far more complex than fig. 2 suggests. Industrial formats developed side by side with a growing culture of consumption and new machinery suitable for small-scale manufacture, leading to increasing levels of production through various channels. Personal dressmaking practices did not disappear but developed and transformed together with the expansion of mass-produced clothing, in a complementary rather than a substitutionary way.

Understanding current developments in historical context, this study questions how the popularization of emerging systems can solve the problems of traditional ones. While apparel "smart industries" are in development, mass production of clothing is not showing signs of decline. Therefore, the capacity of the "forth industrial revolution" to enable beneficial changes such as localizing the industry or diminishing industrial waste is contested.

The industrialization of the apparel sector: a broad literature review

Historians studying the rise of the apparel industry acknowledge that assumptions about this process are not uncommon. "We assume that before the industrial revolution clothing, at least for ordinary people, was made at home. This is not so" writes social historian Judith Coffin (Coffin 1996, p.22). In a detailed account of the making, selling and consuming of garments during the 18th century, Coffin stresses that while maintenance of clothes was a domestic task, new garments were mainly provided by tailors. The kind of dressmaking service varied to a great extent, from traveling craftsmen sewing simpler clothes in the countryside to urban, sophisticated dressmaking shops (Coffin 1996; Perrot 1994). Home sewing was restricted to very simple clothing such as shirts, smocks, caps and baby clothes, until well into the nineteenth century, given the difficult nature of crafts-based dressmaking without the assistance of paper patterns or sewing machines and the structural complexity of clothing in those times, specially for women (Arnold 1999; Wilson 1999; Fernandez 1994). Those with more limited income relied on the second hand market; therefore garments went through several cycles of use, trade and alteration, slowly descending in social class (Perrot 1994).

In terms of design, there was an intricate and strict set of rules related to gender, class and regional identity to define the appropriate dress. Clothing served the explicit function of linking individuals with social structure, for example by identifying the street seller in the public space (de Leeuw 1993). Moreover, tailors were subject to design norms determined by their guilds and put into practice according to the client's social position (Perrot 1994). Even when the production system (cutting and sewing by hand) virtually allowed a great variety of dress typologies and the active participation of the user both in design and manufacture,

reports of dressmaking practices show that these were very restricted, in the case of design decisions by rigorous dressing rules, and in the case of manufacturing by the level of knowledge and skills needed for dressmaking without more sophisticated technologies than a pair of scissors, thread, and needles. Such restrictions, unlike the diagram in fig. 2 suggests, diminished with the industrial revolution through the development of new sewing technologies with lower barriers for amateur dressmaking and the dissemination of an arguably more flexible set of dressing rules, that of fashion's changing trends.

Radical social and political changes during the second half of the 18th century led to rupture in former sartorial codes. In 1793 Paris a decree was issued stating that "[n]o person of either sex can force any citizen, male or female, to dress in a particular way" (Perrot 1994, p.20). In line with the rise of the bourgeoisie, a more fluid social configuration was emerging; one in which "work with its fluctuating fortunes, rather than rank and hierarchy ordained by lineage, was an important determinant of an individual's status" (Wilson 2003, p.24). In response to this potential social mobility and associated to the increasing purchasing power of the emerging class, clothing demand rose unprecedentedly in all sectors of the population, leading apparel traders –in particular those involved in the second-hand market- to start experimenting with novel ways of organizing production and sales (Perrot 1994; Coffin 1996).

During the 19th century, northwest Europe saw the boom of ready-made clothing. At first manufacturing only simple items such as underwear, the ready-made industry developed based on the manual labour of both home sewers and workshop workers. Coffin has highlighted how female homework was central for its exponential growth, given that the domestic environment allowed women to keep "decency" while contributing to the economy of the family. These women received seasonal assignments from ready-made traders and their own clients alike, while making clothes for their own families. The author states that "[o]ne of the most striking features of the garment industry's history is the resilience of industrial homework, which flourished and grew alongside new modes of production, rapidly expanding markets, and new patterns of consumption" (Coffin 1996, p.7).

By the time the sewing machine was adopted, during the second half of the 19th century, there were well-established networks of home workers side by side with small production units. Clothing production volumes were escalating in line with the development of the department store and an increasingly significant culture of consumption. The availability of ready-mades gave access to brand-new, cheaper clothing and new items such as underwear to the lower classes; as a consequence, the second hand market was in decline. Perrot's account of the substitution of Paris's emblematic second-hand market "Temple" in the 1860s by shiny pavilions offering mostly ready-mades illustrates this shift. Meanwhile, used clothes started to be exported oversees (Perrot 1994, pp.70–71).

Tailors and dressmakers were naturally not indifferent to these developments. They dismissed the poor quality of ready-mades, and accused them to have corrupted a honourable industry. While figure 2 suggests that their disapproval was associated to the fact that their work was taken over by mass-manufacture, historians have described a shift in their roles rather than an overall decline, with specific forms of dress craftsmen and women emerging and vanishing during two centuries (roughly 1750-1950). Perrot notes that the popularization of ready-mades during the 19th century encouraged tailors to position themselves in opposition to mass-manufacture, as artists whose domain was that of elegance. While ready- mades took over the production of simple garments, female dresses had to be fitted to the body and therefore remained the job of dressmakers (Perrot 1994, pp.69, 184). In any case, the production volumes of the ready-made industry were outstanding, and that is perhaps a reason behind the common belief that ready-mades substituted made-to-measure during the process of industrialization. This review suggests that the substitution may have been more symbolical and relative than real, as Perrot points out; "[g]iven the demographic growth and prestige of Paris, as well as a rise in the standard of living, the production of made-to- measure clothing did not suffer an absolute decline but was greatly outdistanced by the dynamic, many-sided ready-to-wear industry (Perrot 1994, p.68)"

The sewing machine, fashion magazines and the rise of self-made clothes

At the turn from the 19th to the 20th century, two key developments accompanied the increasing acceleration and importance of fashion trends, together with growing volumes of clothing production: the popularization of paper patterns and the domestic sewing machine.

The sewing machine is often seen as a key innovation for mass-produced ready-mades to have substituted amateur and professional dressmaking; however, a closer look to the actual effects of its popularization let us understand its implications in a different way. Although originally developed for the manufacture of simple ready-to-wear, the sewing machine soon became a useful and popular device for home sewing, supported by strategic product development and advertising campaigns of manufacturers (Coffin 1996). Its "astonishing velocity" did in fact boost industrial production, but fashion historians have also suggested that it augmented production and consumption of home-made and made-to-measure apparel in Europe and the USA (Burman 1999a; Fernandez 1994; Parmal 2001; Putnam 1999).

While the widespread adoption of the domestic sewing machine allowed for more efficient and sophisticated self-making practices - especially for women – developments in printing technologies and the popularity of fashion magazines served to inform and assist home- sewers in design decisions and the cutting process.

During the second half of the 19th century, fashion magazines had become more affordable and acquired wider readership, the publishing industry grew significantly based on the introduction of novel fashion trends with increasing frequency. The ready-made industry was still focused on the production of underwear, simple garments, and, towards the end of the century, menswear; therefore these magazines ended up inspiring mostly professional and amateur dressmaking. At the turn to the 20th century, these publications were increasingly incorporating enhanced technologies for more efficient dressmaking, lowering the skill barriers for amateur practices and popularizing the practice of self manufacturing (Emery 1999);

> *"Unlike the home dressmakers of a generation or two before, their Edwardian counterparts could make clothes as stylishly as they wished from patterns designed to provide up-to-the-minute fashions promoted with clear seasonal differentiation and frequently with full directions for making-up. There was no shortage of advice to accompany them, particularly when new styles were introduced. The language often mixed promise and exhortation. There was much emphasis on the variety of choice available in the look of the finished article and on speed, simplicity and ease of construction" (Burman 1999b, p.46)*

While the anonymous voice of fashion editors was disseminated through such publications to home-sewers, making fashion available to all, professional dressmakers were benefiting from the search for class differentiation of the higher sectors of the population. Professional dressmaking was more expensive than homemade clothing and access to informed craftsmanship in Europe and North America was a practical way to emphasize the new stratification. The perfectly fitting garments and exclusive service of dressmakers resembled the glamour of Parisian couturiers and succeeded to position their clientele as a sophisticated and at the same time modern social group (Putnam 1999; Benson 2001; Hay 2001; Parmal 2001).

Both technological innovations and the growing relevance of fashion trends contributed to a general increase in the production and consumption of clothes during the end of the 19th and the first half of the 20th century. Wardrobe sizes grew accordingly (Klepp & Laitala 2015), but unlike fig. 2 suggests, increasing consumption found its way not only through industrial production but also through professional and amateur dressmaking practices. Rather than a simple substitution of individual dressmaking by mass produced

clothing, that period saw the growth of a variety of production methods with different levels of popularity depending on region, social class, and clothing type, providing more opportunities for user participation in design.

Primary sources in the local context: a quantitative analysis of the process of industrialization in the city of Amsterdam (1889-1930)

Historians have made an effort to illustrate the point of view developed above based on primary sources, in order to contest visions of industrial substitution. However, the lack of reliable and consistent data, in particular for home dressmaking, has been detrimental to their efforts, leading to confusing results. For example, different quantitative studies of home sewing during the interwar period in Britain have pointed to both an increase and a decrease in the popularity of this practice (Burman 1999a, p.6). With the aim of contributing to this inquiry from a local perspective, I have intended to trace relevant data within the micro-level of the city of Amsterdam. Unfortunately, however, I have encountered constraints as well.

The occupational census carried out in the Netherlands in 1889, 1899, 1909, 1920 and 1930, could be a useful source to map the amount of independent professionals devoted to made-to-measure dressmaking during that period; but the discontinuity of occupation categories, moreover lacking a specific definition, hinders the possibility to develop a local map (see Table 1). For instance, how many of the seamstresses in Table 1 (naaisters, huisnaaisters, and costuumnaisters) worked for the ready-made industry and how many contributed to the work of tailors and dressmakers working on demand? Did the company directors in the clothing sector (bedrijfshoofden) computed in 1920 and 1930 manage an industrial setting or a workshop comparable to that of costumiers, explaining the removal of the latter as an occupational category after 1909? The impossibility to answer such questions with the available sources impedes a reliable comparative study.

Table 1: Population working in occupations relevant for this study in Amsterdam (1889-1930)

Occupation	Position*	1889	1899	1909	1920	1930
Costumiers	A+B	44		1,930		
Costumiers	C+D			3,289		
Dameskleedingmakers	A+B	70				
Dameskleedingmakers	C+D	71				
Kleermakers	A+B	954	2,827	774		
Kleermakers	C+D	1,827	4,471	3,243		
Naaisters	A+B	406	1,001			
Naaisters	C+D	4,150	1,691			
Verstelnaaister	A+B			2,028		
Verstelnaaister	C+D			89		
Bedrijfshoofden	A+B				1,660	1,897
Kleermaker (heeren)	C+D				3,976	
Kleermaker (dames)	C+D				6,660	

Occupation	Position*	1889	1899	1909	1920	1930
Kleermaker (dames en heeren)	C+D				84	
Huisnaaisters	C+D				1,771	979
Kleermaker (maat)	C+D					2,027
Kleermaker (confectie)	C+D					1,441
Costuumnaaister	C+D					4,462
Confectiefabriekarbeider	C+D					2,576

Note. Elaborated by the author based on the occupational censuses published by CBS (Centraal Bureau Statistics) http://volkstellingen.nl/nl/index.html [Accessed September 9, 2015]
* Positions A+B refer to business owners, managers and independent professionals; C+D refer to staff in companies run by others.

The popularity of dress self-making could be compared with professional dressmaking and production of ready-mades by mapping the consumption of fabrics and sewing material in relation to that of complete garments, but unfortunately the statistical records of Hoofdbedrijfschap Detailhandel and Centraal Bureau Statistics do not include information that is detailed and reliable enough for such a study. The retail of sewing machines has been kept as a statistic category along the 20th century; however, discriminating machinery commercialized for the ready-made industry and that for professional and amateur dressmaking is not feasible either.

Table 2: Overview of the population dedicated to clothing in the Netherlands (1889-1930)

	1889	1899	1909	1920	1930
1) Population dedicated to clothing	Category VIa	Category VIIa	Category VIIa	Category VII (1-10)	Category VII (1-10)
	59,915	69,328	78,357	95,911	89,094
2) Total population censused	4,509,670	5,104,137	6,091,802	7,225,493	7,935,565
3) Workers dedicated to clothing per person censused	0.01328	0.01358	0.01286	0.01327	0.01122

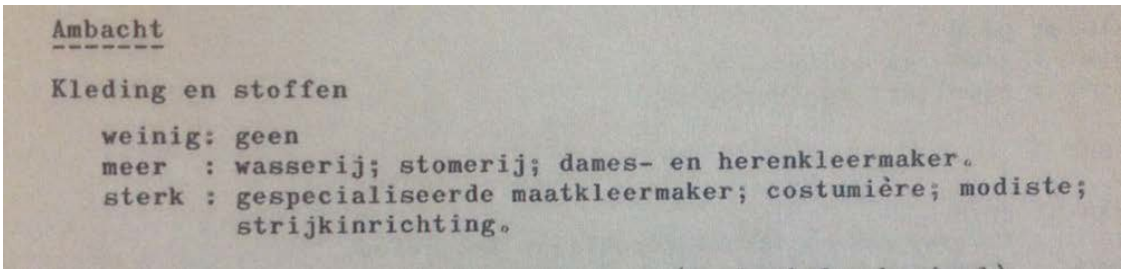
Note. Elaborated by the author based on the occupational censuses published by CBS (Centraal Bureau Statistics) http://volkstellingen.nl/nl/index.html [October 20, 2015]

Despite the struggle to draw a quantitative map, the increase in consumption and production of personalized clothing (clothing produced on-demand on the basis of consumer input) in parallel to that of ready-mades is recognizable by the transformations described in the previous section.

One conclusion that can be taken from the available data is that the general amount of clothes produced at a national level increased significantly, even if we do not consider clothes made at home. Table 2 (row 3) shows that the number of professionals in the field of clothing production per consumer was quite constant; if we assume an increase in productivity per worker based on the development of more efficient ma-

chinery and organization of work, we can conclude that individual consumption was escalating. Why then, to assume that only factories producing ready-mades were growing?

In fact, some sources indicate quite the opposite. A report of the statistical office of the Municipality of Amsterdam covering the developments in retail within the centre of the city (1900-1960) supports the argument of a local increase in professional dressmaking (Bureau van Statistiek der Gemeente Amsterdam 1966, p. 121). In an appendix focused on the apparel sector, the document identifies a growth in the amount of stores dedicated to crafts during that period. The report highlights an increase in professional dressmakers (for ladies and gentlemen) and a particularly strong increase in those working made-to-measure and *costumieres* (fig. 3).


Ambacht

Kleding en stoffen

weinig: geen
meer : wasserij; stomerij; dames- en herenkleermaker.
sterk : gespecialiseerde maatkleermaker; costumière; modiste; strijkinrichting.

Figure 3. Report of the statistical office of the Municipality of Amsterdam indicating an increase in professional dressmaking during the period 1900-1960 (Bureau van Statistiek der Gemeente Amsterdam, 1966, p. 121).

This section intended to contribute to our understanding of the impact of industrialization in sartorial practices in the Netherlands and the city of Amsterdam. The central argument is that industrialization boosted production and consumption through all three channels (mass production, self production and professional dressmaking services) from the turn to the 20th century, accompanying emerging values of modernity and the dissemination and acceleration of fashion trends. In fact "it is only since the Second World War that mass-produced, ready- to-wear clothing has become the standard wear for everyone" (Wilson 2003, p.89), the next section will uncover the shift from a diversity of production and consumption models to the triumph of ready-mades.

The triumph of mass-produced ready-mades and the role of fashion trends

If, as argued above, industrialization supported an increase in production and consumption of clothing at all levels: how and why did mass-produced ready-mades become the standard wear for everyone in current post-industrial regions? User involvement in design and manufacture in order to achieve variable products is a main goal of current industrial development; why, then, was the user excluded from the processes of design and manufacture of clothing around half a century ago?

Historical accounts based on the analysis of production systems explain this transformation through the increasing comparative advantages of ready-mades. The clothing industry started producing only simple garments, slowly expanding to offer menswear and finally women's clothing. While the quality of early ready-mades was poor, industry diversification made possible to provide better quality garments as well; moreover, standard sizes became more accurate and varied, responding to real body shapes. As a consequence of technological and organization developments the costs and prices of these garments decreased, making ready- mades increasingly competitive (Levitt 2009; Godley 1997). According to these perspectives, by the middle of the century ready-made clothing was just varied, good, and cheap enough to displace other ways of making clothes.

Although this view provides a linear and encompassing explanation for the decline of personal dressmaking, we should keep in mind that this process took more than a century, involving several generations of producers and consumers. During that period, various aspects of clothing production and consumption changed, including the values associated to dress. Rather than looking at this as a linear historical process assigned to technological innovations, this study identifies two successive processes. One gradually developing during the 19th and first half of the 20th century in which a variety of production methods flourished all together and another one during the second half of the 20th century, when personal dressmaking declined on the bases of several phenomena. A main element was the importance and speed of fashion trends during that period.

Fashion historians have already acknowledged a shift in the image of ready-mades during the first half of the 20th century from cheap, utilitarian products to desirable symbols of modernity. Pouillard (2013) has studied how early North American apparel brands made explicit efforts to integrate fashion trends, at first by illicitly copying the creations of Parisian couturiers and later finding agreed ways of collaboration, leading to the development of fashion design departments in apparel companies. Such efforts were certainly significant for the economic success of ready-made entrepreneurs as the 20th century advanced. Marcketti (2005) has pointed out the relevance of changing dressing styles for their prosperity, stressing that although technology was central at the early stages of their growth, speed of fashion change was more important for their final success.

The speed of fashion trends was in line with that of industrial production, leading ready-made entrepreneurs to integrate them more successfully than professional dressmakers and home sewers. Quality and durability, clear advantages of custom and homemade garments, were less relevant for consumers in the context of rapidly changing aesthetic ideals.

If at first technological developments and fashion awareness had contributed to an increase in production and consumption at all levels, as the 20th century advanced professional dressmakers started to struggle to keep up with the speed of these transformations. Kaipainen (2010) has uncovered this process through a thorough study of Finnish tailor magazines, which promoted rapid reaction to new trends as an essential aspect for the survival of bespoke tailoring. According to Kaipainen (2010) "[n]ot succeeding in copying the latest trends was one reason for the decline of bespoke tailoring; despite all the efforts the ready- made suits were often considered trendier than the bespoke ones".

Maldini & Manz (2016) have highlighted the importance of fashion trends for consumers as an explanation behind the decline in personal dressmaking. Based on a set of interviews with ladies living in a nursing home, the authors claim that during mid 20th century home and custom dressmaking were still the main practices for Amsterdam ladies. Interestingly enough, they were not the most desirable; it was a common practice to study trendy ready-mades visible in shop vitrines as bases for personal dressmaking. Although personalization and exclusivity of dress were already of value at the time, adherence to mainstream fashion proved to be a stronger force. The interviews revealed that by the second half of the 20th century, when ready-mades became more "convenient" in economic terms, they had been already established as "ideal" in terms of style, enabling a transition from a plurality of models of consumption to the triumph of mass-produced ready-mades.

The main argument of this historical overview has been that perspectives based solely on the development of production systems tend to flatten the complexity that industrialization actually entailed. By analysing the specific process of industrialization in the apparel sector and considering both technological and socio-cultural phenomena, a different picture arises. Unlike views represented in fig. 2 suggest, the process of industrialization did enable increasing user participation in design and a greater variety of products. Growing levels of production and consumption through a variety of channels were central for this process, with the popularization of self-made clothes playing a main role. By mid 20th century, however, the importance and speed of fashion trends (among other factors) led to a decrease in the popularity of personal dressmaking.

Conclusion

The introduction of this article highlighted the importance of understanding the process of industrialization in order to analyse current developments in historical context. The overview above points out that historical generalizations may lead to visions of industrial substitution; that is industrial production substituting craft-based personal dressmaking during the turn to the 20th century and consequently on-demand flexible manufacture possibly substituting mass production in the future. However, when the analysis focuses on the apparel sector and broadens to include a variety of sociocultural phenomena, the resulting vision is that of coexisting models of production. According to this historical perspective, emerging models do not substitute old ones but they find their way to complement what is already established, transforming each other in the process.

This way of looking at historical processes leads to an understanding of current developments in the apparel industry not as substitutionary of mass production, but as complementary. Therefore, the implications of emerging production systems manufacturing personalized products on-demand are to be understood in the context of current prevalent industrial models, at least for the near future. Promotion of the "industry 4.0" or "smart industry" on the bases of moving manufacture facilities nearer to the consumer, diminishing industrial waste, and turning the overall chain up-side-down starting at consumer demand tend to overlook that these developments are happening side by side with a growing, global mass-manufacture industry. Increasing the offer of sophisticated product-service systems does not imply that the old ones will be abandoned. In a sector characterized by continuous acceleration of product renewal and growing wardrobe sizes, the incorporation of new practices in addition to established ones is definitely to be expected. Rather than highlighting how emerging systems are better, we should ask ourselves what they add to the already established apparel industry.

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Abstract: Ahola (Aloha Backwards): Social Practice Fashion Honolulu Style

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KEYWORDS

Social practice fashion, site-specific fashion, public fashion, communitarian fashion, participatory fashion project

ABSTRACT

To non-residents, Hawaii embodies the archetypical tourist destination —erupting volcanoes, magnificent beaches, surfing lifestyle, and hula dancers; a year-around place of adventure, romance, and relaxation; the perfect setting for advertisements and movie fantasies.

However, the realities of contemporary life in Hawaii's are quite different from those idyllic visions. The site-specific fashion project Ahola (Aloha Backwards) mined those dichotomies by integrating fashion design and public art methodologies to engage the local community. In so doing, Ahola adapted a Social Practice Fashion framework to the social and cultural context of Hawaii while empowering Honolulu residents, allowing their direct input at every stage of the project's realization. This paper analyses how Ahola took advantage of standard methodologies from the fashion industry's as tools for social activism and includes a discussion on the implications of the project's methodology as a viable approach for socially conscious fashion design practitioners.

Exploring the Conscious Move of Contemporary Brands Towards a Sustainable Future Through the Use of Craft and Handloom Processes of India.

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KEYWORDS

Craft, Handloom, Sustainability, Responsible Designing, Ethical Sourcing.

ABSTRACT

Craft plays a potential role towards a sustainable future. The demands of the prevailing global environment are clearly obvious to all, including the fashion fraternity. Design historian, Gillian Naylor, in her book The Arts and Crafts Movement, mentions, “The Arts And Crafts movements were inspired by a crisis of conscience. Its motivations were social and moral, and its aesthetic values derived from the conviction that society produces the art and architecture it deserves...”.It keeping with her observation, many conscious brands are moving towards responsible and sustainable business models for keeping themselves 'future-ready'. To maintain the balance of the fashion ecosystem, it is the impetus to move towards adopting crafts and handmade processes for survival. India is a craft hub. Its cultural diversification across the map has weaved within its folds, several craft practices, and traditional handloom techniques. These conventional crafting methods are indigenous and often adhere to natural sources for their raw material. Therefore these handmade-processes are mostly eco-friendly. These time-honored methods are ethnic and developed as a natural response to the characteristics of the surrounding region, hence not harmful to the environment.

The paper discusses the popular handmade Indian techniques that are used as a resolve towards this deliverable. It further defines sustainable business models practised by various brands. The aim is to explore how fashion brands are moving towards product diversification that focuses on handloom and handicrafts of India. Some brands are studied to understand their involvement towards sustainable design solutions through ethical sourcing. It explores the threats faced by the craft sector of India and how sustainable fashion developments can give artisans a better livelihood. Finally, the paper concludes how the emerging environment and sustainability issues help establish crafts as a productive force in the development of new socio-ideological rationales towards our concern to save Intangible Cultural Heritage.

Introduction

The increasing global population and its volumetric demand, supported by the advent of modern technology, have moved crafts and slow process technique of production to the back seat. The technology-driven, mechanised process of production contributes to the chemical waste that supplements the carbon footprint. The threat to the ecosystem is increasing with the practice of contemporary, quicker processes. The demands of the prevailing global environment are clearly obvious to all, including the fashion fraternity. Design historian, Gillian Naylor, in her book The Arts and Crafts Movement, mentions, “The Arts And Crafts movements were inspired by a crisis of conscience. Its motivations were social and moral, and its aesthetic

values derived from the conviction that society produces the art and architecture it deserves...". 4 Keeping her opinion into consideration many conscious designers and brands are moving towards responsible and sustainable business models for keeping themselves 'future-ready'. To maintain the balance of the fashion ecosystem, it is the impetus to move towards adopting crafts and handmade processes for survival.

Research Methodology

The paper is based on exploratory research. It involves observation, interview, survey and case study method to take the topic forward and draw conclusions. Secondary data was drawn from articles and websites on the related subject. The research methodology comprises of qualitative data collected from various brands, exporters and craftsmen. The intent is to unravel the future of sustainable business models sourcing from handloom and craft clusters and understand why they are leaning towards the slow process. Journalistic publications on 'Sustainability' and 'Craft based Sourcing' were studied to get an insight into the present understanding of the development of new socio-ideological rationales.

The paper is based on a micro study of fashion brands that are sourcing from India. The business model of five companies was undertaken who are crusaders of sustainable fashion in their own humble way. The business model of Gope, an Indian craft-based brand who sells in London was conducted through a personal interview with designer and owner Raja Gope. A detailed study of the business practice of Novica, through secondary research, was conducted, which claims to have sent over $70 million to artisans around the world! The source for this innovative model was secondary as primary data could not be collected despite many attempts. This is a limitation of this research. A personal interview and a visit to the factory of Sunil Enterprises helped understand the standpoint of Moumita Biswas and their philosophy as an Exporter who supplies to several global buyers. They produce their merchandise only from craft hubs. Sudha Gorai from Georgia was available through an electronic interview to provide information about her brand 'Always Aanya' which sources from Sunil Enterprises. Gabriela Schaaf from Zurich provided insight about her brand Living Room Shop through the electronic interview. Several other buyers were interviewed but due to the paucity of space were not included but helped draw conclusions.

People Tree, an UK based brand, well known for sustainable fashion was studied. Primary data was collected through electronic interview, regarding People Tree's involvement in supporting new socio-ideological environment in India through their producer Rajlaxmi Cotton Mills. The study also comprises of primary data collected from 50 artisans to get a holistic understanding of problems faced by them as suppliers for the global market. 30 Kantha artisans from Nanoor and 20 weavers from Phulia were interviewed through survey method.

Fig 1. Hand Crafted Bags Being Finished at Gope Workshop. These Bags are Hand Printed and Embroidered by Local Artisans. Source: Raja Gope

India-A Craft Hub

India is a nucleus of conspicuous craft practices. The diverse presence of handmade processes across the length and breadth of the country makes it a sourcing paradise. The ethnic miscel-

[4] Naylor, G. (1989). The arts and crafts movement.

lany and the geographical diversity gave birth to several craft hubs across the country. The indigenous processes of hand made products and handloom textiles have been an identity for India. Craft process in India, unlike many other parts of the world, was not only an ethnic practice related to the socio-cultural environment but a survival mechanism. Ever since the colonisation of the country by the British, Indian freedom fighters led by Mahatma Gandhi, took to Khadi as one of silent weapon against the British Raj. He championed the indigenous hand spun and hand woven Khadi, which instantaneously became the symbol for India's struggle for freedom. One effect of the economic crisis was the adoption of the *charkha* (spinning wheel) and other craft techniques by the rural masses to accommodate to their own clothing needs and later to earn a living. Craft and handloom have been a valued resource and a USP for India. The government has even since independence adopted policies to encourage growth in both these sectors to the extent of implementing several training schemes to upgrade the artisans and weavers.

Ashoke Chatterjee therefore aptly puts, *"For almost 60 years, the Indian Government has been unique in its commitment to the craft sector, a legacy of the swadeshi movement and the ethos of a national identity fostered during the freedom movement. Unlike most developing countries in India, crafts have been given a place in national planning".*[5] *Lucy Donkin describes this relationship between craft and the social fabric, in Crafts and Conservation as, "Crafts are not simply a particular way of making objects, but are inextricably bound up with the structures, values, history and identity of the communities in which they are practiced".* [6]

Popular Craft and Handloom Processes

Bengal, the once cultural capital of British Indian, is a potential craft cradle. West Bengal is known for its exquisite needlecraft called Kantha– an age old quilting technique which by itself is a sustainable craft which produces zero waste. Previously it was made of old sarees or recycled and discarded cloth. Now the craft is being up-cycled to suit many sustainable practice chains. Holding hands of 'She Foundation', an initiate by Kantha exponent Shamlu Dudeja, this embroidery has been up-scaled to niche finery. She exports all over the world and has been supporting more than 200 women artisans. The Shantipur and Phulia hand-woven *tant* (loom) fabric is appropriate for any eco-friendly fashion brand across the globe. Many of the weavers are trained to use Neelam Shade Card, a local parallel for the PantoneColor System and follow the Trend-Forecast. They produce hand-woven scarves for many American and European brands like Boho Gypsy, Always Aanya, Leon & Harper, Madura FR, CFOC etc.

Ikat is an interesting process of tying the yarn at strategic intervals and then dying it before setting it as warp or weft or both on a handloom. These hand-woven fabrics give a rustic feel with the equally artistic appeal. This technique is practice both in Odisha and Andhra Pradesh in India and is very colourful. The weavers are now being trained to use the globalcolour palette and mute it down to suit the European aesthetics. Varanasi is another weaving hub where silks, tissues and finest silk jacquards are hand-woven by highly skilled weavers.

People Tree from the United Kingdom and Zara uses Ajarak and Dabu hand block printed natural fabrics sourced from Rajasthan in India. Special care is taken to keep them azo-free. Natural colours are the usual mandate. These resist print techniques have an unequal beauty being essentially handcrafted. Indigo print and indigo dyed handmade fabrics from Rajasthan are also very popular in the Global market. Likewise, Serampore, close to Kolkata is a screen printing hub which caters to many international buyers. This was set up by the British, who taught a few indigenous block-print makers the art of making screen printing.

[5] Ashoke Chatterjee, 2006. The Indian Craft, Sunrise or Sunset in the Global Market, Craft Revival Trust [online] Available at:<http://www.craftrevival.org/voiceDetails.asp?Code=106

[6] Wood, S. (2011). Sustaining crafts and livelihoods: handmade in India. Sustainability in Craft and Design, 89.

Sustainable Business Model- New Alternatives

"We live in a world impacted by economic growth drivers of decreasing natural resources and increasing population. A shift toward a sustainable mindset does not seem a choice but a necessity".[7] The word sustainability can be defined from various perspectives and taken a different drift in each direction. From an entrepreneur's point of view, we may consider the following key essentials under sustainable development-pollution prevention, resource productivity, environmental management, sustainable technology, social entrepreneurship, corporate social responsibility, human and labour rights, transparency and stakeholder management. [8]

The apparel industry is a leading contributor to the world economy; therefore its approach towards sustainability has a great impact on the future direction towards ecological balancing. The emphasis, so far to achieve sustainability is concerning raw material and product. The buzzword is 'eco-friendly-home grown' raw material, that uses zero chemicals and environment-friendly production process. In terms of the end product, designs are made to recreate a new eco-ethnic-chic aesthetic, using the traditional slow processes which include, handmade and hand-woven methods. Recycling and upcycling are two pillars on which sustainability stands tall.

Industrial production has progressively substituted traditional handmade production globally, over the previous century. This resulted in the loss of traditional markets for artisans and craftspeople, especially in developing countries like India. Khadi, for example, the most indigenous industry, therefore, struggled to contest against the economic and production proficiencies of volume manufacturing, piloted in by cutting-edge technology, and mechanisation.

However, in recent times, the environment conscious 'green consumer' with an ethical bent towards craft, and the handmade have opened new markets. They have compelled new aspirants and subscribers of sustainability to redefine new business models. According to M. A. Gardetti and S.S. Muthu, the Indian artisans are well situated to tap into this developing market, "as consumers develop more of an understanding about the externalized environmental and social costs of a product, as it moves from extraction to production, to distribution, to consumption, and disposal". [5]

Brands Adopting Crafty Ways

Many global brands have taken the onus of being responsible commercial enterprises. At the onset, some have declared themselves to be ethical and strived towards achieving a number of certifications like Craftmark, Energy Star, Designed for the Environment, Fair Trade, etc. while others are on their way. An extensive study of a few brands that support ethical fashion and adopted traditional slow processes was conducted to understand their conscious move towards sustainability.

Nope

Raja Gope of Gope has his own definition of a Sustainable Business Model. During his interview, this young entrepreneur, a graduate from NIFT with a Masters from London College of Fashion, explained his model which deals with crafts. Raja produced bags and shoes- value added using Kantha Embroidery of Bengal. He explains, "My Philosophy is working with crafts and making a difference to the life of people involved in the process. However, it is important to keep it economically viable." According to him, "smart product de-

[7] Ivan, C., Mukta, R., Sudeep, C., & Burak, C. (2015). Long-Term Sustainable Sustainability in Luxury. Where Else? Handbook of Sustainable Luxury Textiles and Fashion Environmental Footprints and Eco-design of Products and Processes, 17-34. doi:10.1007/978-981-287-742-0_2

[8] Gardetti, M. A., & Muthu, S. S. (2015). Sustainable apparel? Is the innovation in the business model?-The case of IOU Project. Textiles and Clothing Sustainability, 1(1), 1.

sign is a key to ensuring better returns, with less labour intensive solutions". His clients comprise of the British Museum and a few boutiques in London. Raja Gope further elaborates that though he ensures his business model is environment-friendly, pays the craftsmen well and involves processes that are free from health hazards, nevertheless, "No business model can be hundred percent sustainable. Any act will have collateral damage." He wishes to find solutions to undo this damage in future.

His view is supported by M. A. Gardetti and S.S. Muthu's view which states, "Most of the current innovations are welcome but insufficient." Therefore, the confines of present sustainability enterprises are focused on incremental, rather than transformative change. While they may improve sustainability at the margins, they are rooted in a model of consumption that is itself unsustainable (World Economic Forum -2010).[9] To achieve systemic changes toward sustainability, alteration of prevailing business models is therefore needed.

Novica

It is interesting to study the business model followed by Novica, which in association with National Geographic, was founded in 1999 by Andy Milk, Charles Hachtmann, Michael Burns, Mina Olivera and Jose Cervantes. According to them, their business model has a different aim- "More than fair trade, more than microcredit, more than anything else we can think of - if that artisan family is happy, we've succeeded". 7 Novica aspires to provide an international market to the artisans from rural populations, who don't have resources to retail their effort. Their team of local support assists artisans in every region. Product management, quality check, working within deadline is all streamlined by them. They allow the artisan to have all the control. This transparent system allows them to raise or lower product prices or withdraw at their will. They can also give discounts if desired. The best practice in this model is to give due acknowledgement to the artisans. Their website post 'Artisan Stories' against each merchandise. The brand further promotes awareness for endangered traditions through their page 'Keepers of The Arts'. They also help connect contributors to forward their support to artisans.

They select artisans from developing countries including India. The aim is to look for craft based entrepreneurs or artisans who have a forward focus. Micro-credits are given to purchase raw materials and based on returns, further credits and orders are given. It is a cyclic process and stops when one of the partners decides otherwise.

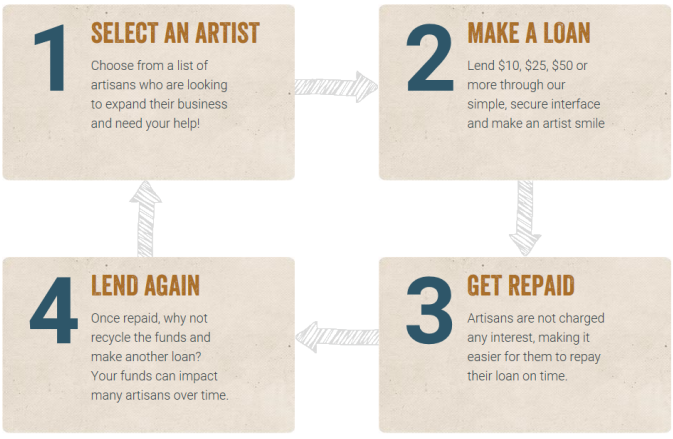

Fig 2. Business Model followed by Novica. Source: www.novica.com

The keywords that inspire this new business model are: 'Happiness. Global Happiness. They have a dual approach to happiness. They are fundamentally driven by Empowerment, Connection and Preservation. But they believe – "We've succeeded only if we make both artisans and customers happy."[10] Attempts to contact Novica to know whether the artisans were happy went futile. Their success can be arbitrated through posts from artisans about their experience, on their website.

[9] World Economic Forum. (2010). Redesigning business value: a roadmap for sustainable consumption. Geneva: World Economic Forum (WEF).

[10] NOVICA | Our Mission is to Spread Happiness. (n.d.). Retrieved December 29, 2016, from https://www.novica.com/our-mission/

Sunil Enterprises

Fig3. Moumita Biswas Shows One of Her Hand Embroidered Scarf during the interview. Photo Credits: Raktim Gangopadhyay

Fig4. Sunil Enterprises Supports Local Women by Giving Them Employment. Photo Credits: Self.

Moumita Biswas joined Sunil Enterprises; a Kolkata-based Export House a decade ago. Presently she is Head of Design and takes pride in an annual turnover of six hundred thousand dollars ($ 600000) approximately for her product lines alone.

She elaborated on the business model followed by the company with an essential policy to manufacture only handmade products. The product line under her department comprises mainly of scarves, table linen, towels and kaftans. The production is outsourced from artisans and weavers from adjoining clusters. The company caters to Boho Gypsy, Always Aanya, Leon & Harper, Madura FR, Living Room Shop, CFOC and several buyers in US, Europe, Japan, UK and Australia. The business model as explained by her comprises the following process in Fig 5:

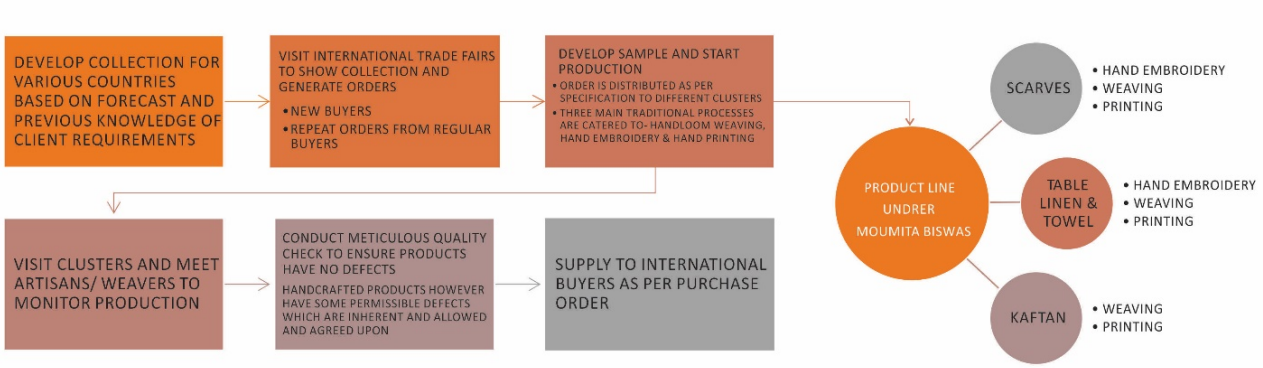

Fig5. Business Model followed by Sunil Enterprises.

The Export House specialises in 'traditional slow processes' comprising of weaving, hand embroidery and hand printing. The sourcing chart below shows details of the same.

TECHNIQUES	SOURCED FROM	SPECIALITY OF THE CLUSTER/ SECTOR
WEAVING- HANDLOOM	Shantipur and Phulia	Plain Weave, Jamdani, Dolby, Jacquard- Cotton, Silk, Wool, Linen& Blends- All Finer Counts
	Bhagalpur	40-60s Lea of Linen
	Himachal-Baddi	Wool

TECHNIQUES	SOURCED FROM	SPECIALITY OF THE CLUSTER/ SECTOR
	Varanasi	Filament To Filament Silk
EMBROIDERY	Birbhum	Sujni and Traditional Fine Kantha
	Barasat	Kantha, French Knot, Shadow Work
	Howrah	Zardosi, Zari and Metal Work
PRINTING	Serampore	Hand Screen and Hand Block Printing
Fig 6. Sourcing Chart of Sunil Enterprise Indicating Local Craft Hubs		

Lavali Biwi, a Kantha artisan was interviewed. She is blissful with the growing demand of hand embroidery. The traditional, time-consuming, all over work has been cleverly replaced by placement embroidery. This allows them to have shorter product lifecycle and a means to earn more through the piece rate system that is followed. Her lifestyle has improved due to her association with this export house. She has re-distributed her order among 200 women artisans and has helped generate income for others.

Some of the buyers of Sunil Enterprises were interviewed through email to understand their philosophy and factors supporting their sourcing from Indian craft and handloom hubs. Two buyers have been used to illustrate their views on sourcing from India and their move towards sustainability.

Fig7. Lavali Biwi Shows Her Exquisite Work during the Interview at Nanoor. Photo Credits: Self.

Always Aanya

With an aim to improve the lifestyle of weavers, the brand's US operations are based out of Johns Creek in Georgia, sources from Sunil Enterprises. The owner Sudha Gorai explained, "It is the most convenient and economic option to source from India." The brand sells eco-friendly handmade products, and she believes that, "Every brand has a nascent desire to standout. Handcrafted goods take care of it to a great extent. Furthermore, it helps to sustain crafts that would or else be lost". Sudha also feels the future of fashion belongs to a sustainable, carbon negative environment. The brand sells from their website alwaysaanya.com and participates in small fairs. The brand philosophy lies in supporting the local weavers of India. Her scarves range from $50 to $65 and comprise of woven, printed and embroidered collections. She does not design but sources from samples developed by Sunil Enterprises.

Fig8. Always Aanya participates in a small open-air exhibition in Atlanta, US. Source: Sudha Gorai, Owner of Always Aanya

Living Room Shop

Fig 9. Gabriela Schaaf and Her Products Sourced from Africa and India. Source: Gabriela Schaaf through E-mail.

Gabriela Schaaf the owner of this Zurich-based lifestyle brand expressed her passion for all things handcrafted during her electronic interview. "I love India. I love the possibility of buying handmade items because they have personality; they all look slightly different..." She echoes what her supplier Moumita has in mind and explains, "I am not looking for perfection and machine made work, I myself love to do handicraft. I knit and crochet and print paper with Indian wood blocks from Jaipur". Gabriela admires the Indian craftsmanship which she feels deserves to be supported. She opines that craft is a great advantage of India. "I know no other country so dedicated to craftsmanship", she declared blissfully. Her brand sources handmade articles from Mexico, Morocco, Bolivia, Senegal, Brazil and India. Gabriela thinks that the traditional handicraft from all these countries is united by one factor: The vibrant colours.

Her products range from quilts, curtains, cushion covers, Indian vintage furniture, wooden block prints and carpets. She sources from Jaipur, Delhi and Kolkata in India. Her aim is to "buy fair traded goods and those produced by women cooperatives". She further adds that her buyers being 90 percent women support her cause. Gabriela has a project in Senegal, Africa where she buys directly from more than 40 women weavers.

People Tree- with a focus on Rajlaxmi Cotton Mills

People Tree is a pioneer in sustainable and ethical fashion and committed to the World Fair Trade Organization standards. The brand was a brainchild of British-born Safia Minney who founded it in 1991, in Tokyo. In 1999, it expanded to England and partnered with Corporative Group. By 2000, the company expanded into 20 different countries, having a turnover of over $1.79 million[11]. Today it is sold in 500 stores around the world including ASOS.com.

Fig 10. A Range Developed by Rajlaxmi (RCM) for People Tree using Organic Cotton Source: Collected from RCMvia E-mail.

According to them, their sustainable business model comprises of their focus to support, to protect, to supply, to provide and to set an example8.The brand collaborates with many Indian suppliers including Rajlaxmi- an export house, and Tara and Sasha, which are non-profit organisations in India. A primary research was conducted on Rajlaxmi Cotton Mills-RCM facilitated by Somsuvro Chatterjee, Assistant Designer.

People Tree supports the economic independence of their producers and allows them to have control over their environment. They are supportive of the Chetna Project which is initiated by RCM, an Organic and Fair Trade Certified garment manufacturing company initiated in 1934. This project was envisioned in 2004 as an initiative to improve

[11] Our Story (n.d.). Retrieved December 25, 2016, from http://www.peopletree.co.uk/

the livelihoods of ethnic farmers from Telangana, Eastern Maharashtra and South Western Odisha. Chetna farmers produce 100 percent OFT (Office of Fair Trading) Certified Cotton and other crops without child labour, synthetic pesticides and fertilisers or GMOs (Genetically Modified Organism).

Chatterjee explains, "Initially RCM purchased almost all cotton produced by the Chetna Project. In 2008, Chetna Organic through its cooperatives picked up a 10% stake in RCM. This relationship provides many additional benefits including the bank loans for farmers, access to pre-finance and other development projects such as supporting schools, vocational training centres, eco-centers, women enterprises etc. in remote villages."The project has under its umbrella international buyers like M&S, H&M, Jackpot, Fair & Co, Green Tea, etc. The stabilised socio-economic environment of the farmers ensures the success of the project.

With a unique focus on varied aspects towards a sustainable goal, these brands have adopted their own path. The focus is to benefit all stakeholders in the supply chain. These brands are wilfully sourcing from small artisan groups and extending their support through the generation of order to improve their livelihood. The approach now is holistic in nature, from micro-financing to health benefits, from empowering women to child education, from fair wages to healthy working conditions. The new socio-ideological grounds are being ventured into.

Threats Faced By Artisans

Despite several global brands depending on artisan produce from India, many artisans are reluctant to supply to foreign buyers. P. Ravasio observes, "The textile industry scores officially a global second in importance, right behind agriculture. However, those numbers should raise our attention to an important factor in the global textile and accessory business that goes usually unnoticed: the industry is in reality massively larger than the official figures suggest. And the statistical grey area is rather huge, be it with respect to the workforce, the income generated, or the social and economical impact".[12]It is this grey area where numerous micro suppliers and craftsmen fall into. There are not enlisted into any government records and their contribution or need for benefits go unnoticed.

Further, they belong to an unorganised sector and have very less knowledge about global trading. Ravasio's view regarding small designers sourcing from India is also applicable for the other side in, "Lacking useful, concrete information ... ended up re-experiencing times and over again the mistakes ... their peers had experienced ahead of them".9 The intimidations faced by artisans engaged in supplying for the export market in India is rather threatening.

Tajquira Biwi, an artisan who was interviewed, elaborated on why she stopped exporting scarves through a mediator based in Delhi. The main threats were quality and inconsistency in the work for the entire 5000 pieces of silk scarves. The pieces were returned and she incurred huge losses. She complained that "The foreign buyer was not aware of the crudeness that the craft inherits and expected each piece to be same as the other". Lavali Biwi, who is a master artisan having 200 women working under her, had a similar experience where her pieces were rejected due to colour bleeding yarns and soiled pieces.

Fig11. During the survey with Tajquira Biwi & other artisans, problems faced were discussed. Photo Credits: Arnab Paul

[12] Ravasio, P. (2011). Sourcing ethically from India. 1-37. Retrieved November 25, 2016, from http://shirahime.ch/

The stories are galore; the problems yet more. The interviews helped sum the following threats faced by them:

1. **Quality issues-** Indian crafts have an inherent crudeness about them and it is difficult to replicate pieces exactly, each being hand crafted. Further artisans are not trained to finish the products with finesse and often fail to achieve international standards unless the quality check is done at every step.
2. **Deadline issues**-Artisans are not equipped to calculate the real time for production and often fail to deliver within the deadline.
3. **Inconsistency issues**- Bigger products, often involve many hands work, to complete on time. This renders an inconsistency in the pieces as different craftsmen have different skill levels.
4. **Raw material & investment issues**- Availability of raw materials and capital for investment are an impending problem. Many are unaware of micro-loans that the government provides as they are not enlisted or do not have artisan cards to avail such facilities.
5. **Communication issues**- Indian artisans are challenged in terms of not having knowledge of English or often being illiterate. Technological support is also a challenge.
6. **Middleman issues**- Artisans depend heavily on a middleman to sell their products. They also take a loan from them and pay heavy interest. In most cases the 'ostagaar' (local term for middleman) makes the profit, leaving the artisan with minuscule.

Sustainable Design Solutions for Artisans

"For a brand or designer that wants to make sure that what is sourced and produced is made under the fairest possible conditions, trying to cut out the middleman will be pivotal."[13] The local producers who wish to enter the global supply chain must hold the hand of local NGOs or cooperatives. The government bodies like AEPC (Apparel Export Promotion Council) and DCHC (Development Commissioner Handloom & Handicrafts) can help solve documentation issues and act as the building bridge between the global buyer and a local supplier.

The core issues lie in being able to convert traditional crafts into smart designs that can be at par with international aesthetics. According to Moumita Biswas, Sunil Enterprises emphasise their success on design solutions. She explains that she studies the trend forecast thoroughly and design her line of scarves and stoles according to the country they propose to supply to. Sometimes she also makes her collection for International Trade Fairs that her company visits like Texworld, Heimtextil, Premiere Vision to name a few. The main hindrance in working with artisans in handloom sector in Bengal, as described by Moumita, is quality issues and delivery time. Her company, however, champions on designs that exploit the identified craft process to the fullest. The designs according to her, "...should highlight the uniqueness of a traditional process and not obscure it. Designs should not expose the shortcomings of a process but cleverly focus on the exclusivity of the craftsmanship". Her view is supported by Gabriela Schaaf who prefers the distinctive unsophisticated handmade products from India.

Apart from clever design, educating the artisans about the international standards is essential, according to Gope. Instead of all-over embroidery, he suggests adding the lesser area of handwork to make products affordable. Sudha clarifies 'handmade' can make even defects look like an effect. These solutions are not unique to India but can be applied in other cultures with textile heritage having similar contexts like Africa, Bangladesh, Nepal and Srilanka. However what makes India stand out as a sourcing hub is the heterogeneous mix of raw materials and techniques available within a smaller geographical area alongside government initiatives.

[13] http://shirahime.ch/WhitePrincess/wp-content/uploads/2011/02/Sourcing-ethically-from-India-guide1.pdf

Conclusion- Crafts as a Productive Force towards a New Socio-Ideological Rationales

Sharmila Wood assumes, "Indian artisans are well positioned to tap into this emerging market, as consumers develop more of an understanding about the externalised environmental and social costs of a product, as it moves from extraction to production, to distribution, to consumption, and disposal". The global buyers who are sourcing from India are not just traders but looking into creating new environments that help the artisan to live healthily and work in better conditions, get a fair wage and expand their horizon beyond the boundaries. Thus craft can be perceived as a productive force towards new socio-ideological rationales.

On one end we have models aimed at economic viability through smart design solutions like Gope and on the other a dual mode of happiness at Novica, where the artisans have full control. While Sunil Enterprises focuses on designs that celebrate the crudeness of the craft, People Tree uses their own designs, produced through sustainable projects in India. The aim of all is to find innovative ways towards harmonising the fashion ecosystem.

Opportunity for employment in the crafts sector, in India, has increased owing to the seeming connection between craft and sustainability. The new emerging market is shifting from niche to mass, ascertaining to be a goldmine for indigenous producers who practice traditional craft forms. India as a nation is conscious of this opportunity. The government is taking considerate initiatives to tap this prospect. Narendra Modi, the Prime Minister is spearheading the concept of 'Make in India', encouraging global players to invest in India. The Ministry of Textiles is geared to position handloom and handicrafts as 'future raw materials' for sustainable fashion before a conscious green consumer. The endeavour will safeguard our intangible cultural heritage and help balance the fashion ecology.

Review of Fashion Product Development Models

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ABSTRACT

The UK fashion industry has changed in the last twenty-five years with the introduction and development of new technologies, increased consumer demands and changing consumer behaviour. These changes have disrupted many business models within the fashion supply chain for example in the areas of consumer expectations, retail formats, product assortment, speed to market and manufacturing (Barnes & Lea-Greenwood, 2006; Christopher, Lowson, & Peck, 2008; Doyle, Moore, & Morgan, 2006; Goworek, 2014; McCormick et al., 2014; Tyler, Heeley, & Bhamra, 2006).There is limited research in the field of Fashion Product Development (FPD) with relatively few theoretical models that support the process (d'Avolio, Bandinelli, & Rinaldi, 2015; Goworek, 2010; Le Pechoux, Little, & Istook, 2004; Silva & Rupasinghe, 2016). These however, are considered dated and do not consider the changes and challenges in contemporary UK High Street fashion sector. This research critically investigates product development in the context of UK High Street 'own label' fashion clothing. In so doing, the research places considerable focus upon inputs, outputs, planning and management in order to map comprehensively the interplay of people, processes and procedures of product development adopted by UK High Street fashion clothing brands. This research aims to challenge the traditional Fashion Product Development Process and present a review of the key literature that is more reflective of the context in which the business model is focused.

Goworek (2010) proposed that to work effectively, fashion product development processes involve co-operation rather than mere co-ordination, mirroring practice in the domain of engineering design as suggested in the work of Boujut and Laureillard, (2000). This idea has formed the basis of this research. Applying theories from New Product Development (Cooper

& Kleinschmidt, 1995; Hart, 1996; Johne & Snelson, 1988; Krishnan & Ulrich, 2001), Project Management (Clelands & Ireland, 2002; Lock, 2013; Major, 2010; Packendorff, 1995; Soderlund, 2004) and Fashion Product Development to identify any parallels, similarities and gaps to establish the contribution. The expected outcome will be a review and contribution to the literature more appropriate for the contemporary fashion industry, responding to the demand for increased speed and decision making when developing fashion products.

Introduction

The purpose of this study is to develop the research thinking about the process of managing the product development process for apparel in different sectors of the UK High Street. This paper reviews the academic literature in the areas of New Product Development (NPD), Project Management (PM) and Fashion Product Development (FPD) in order to help establish a structure of research and a management model

that can explain and support the development of apparel products for contemporary High Street retailers in the UK. The introduction and development of new technologies, plus the changing behaviour of consumers and their demands have disrupted many business models within the fashion supply chain and driven a research agenda for many (Barnes & Lea-Greenwood, 2006; Christopher, Lowson, & Peck, 2008; Doyle, Moore, & Morgan, 2006; Goworek, 2014; McCormick et al., 2014; Tyler, Heeley, & Bhamra, 2006). Furthermore, there is limited research in the specific field of Fashion Product Development (FPD) with relatively few current theoretical models that support the process (Carr & Pomeroy, 1992; Goworek, 2010; LaBat & Sokolowski, 1999; Lamb & Kallal, 1992; May-Plumlee & Little, 1998; May -

Plumlee & Little, 2006). These attempts, however, could be considered dated. They do not consider the changes and challenges in contemporary UK High Street fashion sector. Yet the development of new products is a core activity within the fashion industry, it is a knowledge intensive set of tasks which needs to be continually improved and developed in order to enhance a retailer's competitive advantage. Increasing the frequency and 'newness' of fashion collections has become crucial for the survival of many fashion companies (Tran, Hsuan, & Mahnke, 2011). Consumers demand products that reflect the latest trends and are available to buy immediately. These aspects coupled with the motive to decrease lead times are changing how retailers traditionally worked within the Fashion Product Development process. This drives the need to understand the most effective methods of developing products in the quickest time possible. Considering how to control the process is vital to the success of a retailer (Rosenau, 2001). This complex process, its multidisciplinary nature, and how it is managed is the prime subject of the investigation and will conclude in a contribution to the literature in the Fashion Product Development field.

The UK High Street

The UK High Street is an often used term. For apparel, it can be defined as a market (physical and on line) with short product lifecycles, high volatility of demand, low predictability and high levels of impulse purchasing (Christopher et al., 2008). Importantly, it has evolved and developed dramatically over the last twenty year with many changes regarding how, when, what and where consumers shop. These changes have led to developments in many different areas within the retailing, creative and manufacturing processes as well as the landscape and the market environment. Barnes & Lea-Greenwood, 2006; Christopher, Lowson, & Peck, 2008; Doyle, Moore, & Morgan, 2006; Goworek, 2014; McCormick et al., 2014; Tyler, Heeley, & Bhamra, 2006 are just some authors who have addressed and explored research for the challenges of comtemporary fashion retail . It is these developments that have been a catalyst to the changes in the product development process that is used for apparel products in contemporary high street retailing.

Drivers of Fashion Change

There are some specific developments that have been significant for retailers on the UK High Street. For the purpose of this research these shall be referred to as "drivers of change". These drivers include, developments in;

- new technologies (in business and in consumer lifestyle);
- increasing number of ways in which consumer demands are expressed;
- changing consumer behaviour.

Together, these drivers have influenced and in some cases fundamentally changed the traditional form of consumer expectations, retail formats, product assortment and speed to market manufacturing. Technology is probably the key catalyst for changes in: business processes, behaviour (business and consumer), and consumer expectations. Since the birth of the internet twenty five years ago the retail industry has fully embraced the technological development in all areas of retail. The Internet has without doubt exerted the greatest single force in recent years upon retailing both in the UK and abroad (McCormick et al., 2014).

Technological changes in systems and software has affected the manufacturing of products, and advances in the communication and ease of dialogue between brand and consumer.

Changes in retailing are happening in abundance and they are influencing retailers in many ways. There has been a shift from a product-focused to a more consumer driven strategy in contemporary retailing (Khan, Christopher, & Creazza, 2012).

Private Own Label Product

There has also been a change regarding the retailer ownership of the design of a product. Jackson and Shaw (2008) note that the point of difference for UK fashion retailing is that the structure of the industry is now dominated by fashion retailers such as Topshop and Zara who have developed their own ranges to become competitive and sought-after high-street brands. It is this own label product development of retailers that is a principal interest of this research. These changes in how product is designed and produced mean that the retailers' in-house product development resources are now highly extensive and skilled (Grose, 2012). This has also created a demand for creative product development skills (Goworek, 2010) that is challenging the traditional business model. This form of product development has grown rapidly: it has grown to such an extent that sub-brands and designer diffusion lines are now owned by retailers as part of their range of product lines. It can also be argued that the ownership and full control of these product ranges and the development process is the priority of UK High Street retailers (McGoldrick 2002). The management and development of these processes are crucial to the achievement and success of getting the right products at the right time in front of consumers in order to achieve the greatest margins.

Fast Fashion Epidemic

The term "fast fashion" is used to define a business model that illustrates a more responsive and quicker approach to product manufacture. It describes a business strategy that aims to reduce processes and lead-times within the buying cycle to meet customer demand (Barnes & Lea-Greenwood, 2006). Fast fashion is process that uses the most time effective methods to achieve the shortest time from concept to shop floor. It would seem that most UK High Street fashion retailers have adopted a fast fashion business model in order to address changes in; consumer demand, fierce B2B and brand competition, and the consumption and turnover of fashion and social trends. Fast fashion is acknowledged as being the key strategy for success for modern fashion retailers (Barnes & Lea-Greenwood, 2006). There is a great emphasis on products being in the right place at the right time to satisfy consumer demands. Product design and quality control are minimized or sometimes eliminated from a fast fashion process when products need to be in store within six weeks (Barnes & Lea-Greenwood, 2006).

Retailers are developing product ranges and collections so there is a continuous delivery of new items available for consumers. These short selling seasons are driving a move away from the traditional two to four phases per seasons to, in some cases, twenty phases per season.

International retailers like Zara, are seen to be at the forefront of this model and have streamlined their supply chains to deliver this approach. Today's fashion market place is highly competitive and the need to refresh product ranges has led retailers to extend the number of phases per season (Elena, Giustiniano, & Pirolo, 2013). Fast fashion is a concept that will continue to affect the industry over the next decade and will have a direct impact on the way consumers purchase and react to trends (Bhardwaj & Fairhurst, 2010). However, it is the understanding of consumer behaviour, consumption and their motivation that will initiate a more effective initial product development process and retail performance (Bhardwaj & Fairhurst, 2010). As the speed to market of new styles and trends is becoming increasingly rapid and technology has boosted the sense of urgency among fashion-savvy shoppers for the latest styles, clothing retailers are rolling out new products on a more regular basis and the demand for a fast fashion reaction is greater than ever before (Key Note 2014).

Consumer Demands

Consumer expectation and demand are changing what and when products are available. Forecasting fashion products has always been a difficult and unpredictable. But the use of technology and social digital platforms has encouraged a two way transparent dialogue between retailer and consumer that has led to an increase in expectations and the expression of consumer demand: consumers have increased their ability to communicate their desires. Consumers are more trend aware and informed yet less patient and brand loyal than ever.

These changes in consumer behaviour are having a direct influence on the variety and availability of styles: this is one driver of the move from a four range season to a more continuous cycle of new products that are less season specific.

Consumers have a much more in-depth knowledge of fashion and social trends and this has also increased their expectations of what should be available to them on a product and service level from retailers. The use of technology has contributed to this dramatic rise in instantaneous knowledge of new trends and competitive brands (Elena et al., 2013). Mass communication allows access to latest trends and style information (Barnes & Lea- Greenwood, 2006).

Forecasting consumer demand has always been very difficult to do for a fashion product due to: long product lead times, short selling seasons, weather, and unpredictable demand (Elena et al., 2013). Trying to manage these demands has led to many studies of the fashion supply chain (Christopher et al., 2008; Doyle et al., 2006; Hilletofth & Eriksson, 2011; Tyler et al., 2006) with many successful models and approaches developed to support product manufacturing and supply chain management. Getting a product from idea to store in the quickest yet most effective way possible is important but maintaining the correct product offering is crucial to retail success. Understanding and forecasting demand is complex and unreliable and it has been generally accepted by researchers and industry professionals that demand for fashion products cannot easily be forecast (Elena et al., 2013). There are many demand theories that can be utilized for different consumers and different retailers and to try and develop a "one size fits all" demand model for all fashion retailers is impossible. Just as consumers and brands all have a different identity perhaps the categorization of product types should be considered when thinking about demand forecasting.

Understanding how consumers utilize products will give some indication of how to address the demand issues. A variety of different physical and emotional elements can be associated in the use of products and in turn influence the purchase of new products. If retailers can identify and specify these aspects of consumer behavior they might successfully influence how demand forecasts can be utilized in the product development process.

Fashion Product Development

An area of research that is limited in literature, focussing on more of the departmental stage process models. Fashion Product Development (FPD) can be considered as the strategic planning of goods using the key areas of creative, technical, production, and distribution (Keiser & Garner, 2008). It is essential to the fashion business as a translation of ideas to commercial products (Grose, 2012). These stages are also sometimes referred to as the design process however it is important to remember that the manufacturing element is not usually considered in some of the current research. The design process generally includes all steps involved from generation of ideas and concepts to prototype development of the end product (Pechoux, Little, & Istook, 2004). The main stages in the FPD process are based on the approximate chronological sequence in which they usually occur, though several elements can overlap temporarily (Goworek, 2010). Tyler et al (2006) observe that product development in the textile and clothing industry has been characterised by functional independence with each participant contributing to the process sequentially. They consider that the issues with FPD in the UK are with lead times and that there are a lot of communica-

tion issues between the different functions (Tyler et al., 2006). There are few current theoretical models and research that address the process that will initiate the starting point for this research (d'Avolio, Bandinelli, & Rinaldi, 2015; Goworek, 2010; Le Pechoux, Little, & Istook, 2004; Silva & Rupasinghe, 2016). Goworek (2010) proposed that to work effectively, fashion product development processes involve co-operation rather than mere co- ordination, mirroring practice in the domain of engineering design as suggested in the work of Boujut and Laureillard, (2000). This is one idea that may influence this research. There are few empirical models in the apparel sector and most of the published models are conceptual. It is worthwhile for apparel industrialists to inspire NPD strategies from other manufacturing industries (Silva & Rupasinghe, 2016).

New Product Development

The importance of New Product Development (NPD) has driven a large research agenda by many authors and there is vast literature on the subject (Cooper & Kleinschmidt, 1995; Hart, 1996; Johne & Snelson, 1988; Krishnan & Ulrich, 2001). The literature covers many different elements of the process as well as the variety of issues concerned with NPD. Brown and Eisenhardt (1995) produced a review of the previous literature that addressed the many elements of product development and mapped out the strengths and limitations, the range of disciplines that focus and contribute to NPD. It is the management of these disciplines that is the fundamental concern of new product development (Trott 2008). There is a variety of perspectives from each of the disciplines that are applied to the process that make it a complex process to manage. However, as Trott (2008) points out these should be seen as strengths rather than viewed as a weakness if they do not share a common approach.

Krishnan & Ulrich (2001) take the view that research in product development must be tightly motivated by the needs of industrial practice. This is because product development is essentially a commercial function, and therefore most knowledge about product development does not have much meaning outside of the commercial realm. It is well documented that new product development is resource hungry and is a high risk activity (Hart, 1996). It is the process models of New Product Development that is of interest for this research, Product development models encapsulate the many tasks involved from generating and evaluating the new products from development through to physical products (Hart 1996). Models over this vast research agenda have been catagoriesed by Saren (19840 and Trott (2008). The later models of Network , Mutiple Convergent and Evaluation are a particular interest to this study. Most of the published conceptual models lay the foundation for understanding the generic phases and activities of NPD. They do not consider an NPD model with resource allocation, process standardization, product development cycle time that is necessary for contemporary NPD (Silva & Rupasinghe, 2016).

Project Management

Modern day Project Management (PM) should be a useful too that is available and applicable for today's challenging business environments. Therefore, current academic research should attempt to reflect these changes in order to be relevant (Bryde 2003). Research on project management is not only important for understanding projects. It is also important for wider purposes and can improve the understanding of management in general. (Soderlund, 2004).

PM-focussed research has, again, contributed to a large research agenda for many. It is the current research that challenges the traditional Project Management theories that could be of value to this study. The emergent form of PM is described as being broader in its area of applicability than traditional PM. Perceived as a tool for managing all types of change within all types of organisation and its potential to manage a variety of activities Bryde (2003),Clelands & Ireland(2002), Lock(2013), Major, (2010), Packendorff, (1995),Soderlund, (2004) all contribute to modern PM theory. Packendorff (1995) claimed that project management is largely considered as a general theory that is not sufficiently empirical. Research views projects as tools and project

management is seen as a set of models and techniques for the planning and control of complex undertakings. Soderland (2004) challenges fundamental theoretical issues related to project management research, he argues that a theory of projects cannot be built on merely empirical insights, but has also to be driven by a particular theoretical perspective. Current research on Project management has addressed the aspects of Risk Management (Ahmed, Berman, & Sataporn, 2007; Mu, Peng,

& MacLachlan, 2009), Industry Clockspeed (Chavez, Fynes, Gimenez, & Wiengarten, 2012; Fine, 1998; Souza, Bayus, & Wagner, 2004), Contingency Theory (Caniato, Caridi, Moretto, Sianesi, & Spina, 2014; Chavez et al., 2012), Systems Thinking (Sheffield, Sankaran, & Haslett, 2012) as all areas of approach that influence and determine how project management can run efficiently in the contemporary business world. It is the research from these areas that may be particularly influential to the development of new business models for Fashion Product Development.

Findings of the exploratory research

From the literature reviewed in three key areas there seems to be limited research in the field of Fashion Product Development and there are relatively few theoretical models that support the process. These few, however, are considered dated and do not consider the changes in the industry and demand-led environment of contemporary retailing. Research from the field of New Product Development is vast and considers many different aspects and elements that impact the process. The more recent models consider a variety of ideas and influence to form a reflection of product development that is applicable to a variety of industries. These use the ideas of cross functional, network activities, multi convergent and evaluation processes to develop a more current and multi-disciplinary, participant and evaluation led model.

However, the lack of discussion of time scales and product type in the models in both fields suggest the investigation that will drive this study. Project Management research has added interesting ideas and concepts that can be applied and utilized. The research addressing the areas of time, cost, resource and people planning, as well as links with more specific areas of risk management, Industry Clockspeed, Systems Thinking and Contingency Theory may be influential to this research and the development of a new business model that is applicable to contemporary retailing fashion product development processes.

A combination of these three areas of research will form the basis of this research. The table below identifies the key themes for this study.

Strength	Area / Stage and Activity specific NICPPD Model (May-Plumlee & Little, 1998) – detailed and specific	Area / Stage specific however, variety of model styles investigated, Current model - The NPD Process as a series of linked activities (Trott 2008) Emphasis on evaluations Indication of missing stages where applicable	Detailed planning Time Scales, Consideration to Cost, Resource, People planning Specific tools to aid. How to manage and process key information effectively. Specialist areas to consider; Risk management, Contingency theory, Industry Clockspeed, Systems Thinking
Limitation	Limited models and research NICPPD Model (May-Plumlee & Little, 1998) - could be considered too much detail and difficult to understand Model are of sequential nature Little emphasis on evaluations of stages before continuation	Generic can be applied to apparel – no consideration to impact of environment and industry	Vast information on initial planning stages Continuous projects not widely discussed

Similarity	Areas / Stages No consideration of time scale and how long these processes can take No discussion of product type that could dictate the model style	Areas / Stage No consideration of time scale and how long these processes can take No discussion of product type that could dictate the model style	Sequential stages Recognition of overlap and feedback (similar with NPD)
Difference	Industry specific Terminology and environmental	Research more in depth into the variety of types of models or ideas that can apply to the process Deeper understanding of the process	Vast research area, Deeper understanding of process

Table 1. Key Themes identified from literature review of FPD, NPD, and PM

From a practical perspective it would seem that are advantages to utilising the models and research from New Product Development and Project Management to solve or give applicable solutions to some of the current issues impacting the contemporary field of Fashion Product Development.

The most recent models from the field of New Product Development are much more applicable when we consider the issues that a sequential stage and activity specific model brings. The emphasis on evaluations and missing stages of the process where applicable would also be beneficial to solving the problems of product type and time scales for apparel product development. Alternatively the research into the Project Management field that considers cost, resource and people planning would support a much more strategic and focused way of thinking of the process overall. Risk management processes can address the fundamental issues that face the Fashion Product Development process in terms of speed and unpredictable consumer demands. Contingency theory should at the very least help to improve performance and productivity while understanding the industry clockspeed and linking this to product types will address issues with predicting consumer demands and the speed to market disadvantages. Ultimately systems thinking will address and understand the interactions, overlaps and lack of evaluations within the process overall and aid with streamlining, communication and process management.

Conclusions

From the research into the three research fields it is clear that there are associations and theories that can be applied to develop a practical and theoretical contribution for contemporary retailing product development process. Whilst it may seem that there are some existing Fashion Product Development models such as NICPPD and PPDICR (May-Plumlee & Little, 1998; May-Plumlee & Little, 2006) that are detailed and address the process, it is the challenging time scales, short product life cycles, unpredictability and management of the process that need to be addressed in research. The review by Silva & Rupasinghe (2016) of NPD models supports this idea. New Product Development models and associated theories may not be specific to the apparel fashion industry but offer some interesting ideas on Network , Mutiple Convergent and Evaluation that can be utilised and applied to Fashion Product Development Models. As Silva & Rupasinghe (2016) suggest resource allocation, process standardization, product development cycle time are areas of Project Management theory that can be applied to the existing Fashion Product Development models. It is these additional research ideas and management information that are specific to the apparel industry that may give a more realistic and applicable business model for contemporary retailing issues. Fashion Product Development is not sequential but a series of linked activities that overlap, requires concise planning for time, resources and people to address the implications of demand and speed. As the process is a continuous one these considerations need to be managed to maintain the most effective methods and processes are used to address the challenges facing industry.

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Abstract: Balancing the Books: Creating a Model of Responsible Fashion Business Education

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KEYWORDS

Business, education, ethics, fashion, sustainability

ABSTRACT

Fashion rule broken: Disrupting established hierarchies and communication channels in fashion education and international fashion systems

2016 the fiftieth anniversary of the revolutionary ready-to-wear introduced in Paris, was also the year when the foundations of the international fashion system itself were questioned. The frequency of collections, the plethora of fashion weeks, and the relevance of seasonal or gendered shows have seen much debate. Today's fashion industry is a global one and digital platforms and social media have facilitated the success of many established and new brands breaking away from controlled channels of communication accessed only by a fashion elite.

New ways of working such as co-creation have been embraced, enriching meaning and adding value for brands and consumers (Prahald & Ramaswamy, 2004). Many of our students have established online identities and are accustomed to interacting with fashion brands and creating online content, but rarely is this enthusiasm transferred into an educational context. Students' motivation, persistence, achievement and satisfaction is positively correlated with the pedagogic use of social media (Smith, Haden & Mann, 2012). Furthermore, the 'flipped classroom' points to the efficacy of peer-to-peer instruction (Mazur, 2013), yet many educational practices remain based in static transmission models designed for an industrial age.

A 'global mindset' and the ability to work across cultures is a key graduate attribute for employability (Page, 2014); perhaps even more so for fashion graduates. Whether their future lies in design, production or promotion, our fashion graduates need a global approach to fashion and fashion schools are well-placed to create intercultural creative environments that allow the diversity of the fashion industry to be reflected in our graduates.

Pedagogic researchers predict the future of education to be learning how to learn yet many teachers still have difficulty relinquishing their 'expert' status (Sharples et al., 2014. Social media serves different purposes and caters to different demographics, but at its core is the ability to connect innumerable individuals and 'enable the instantaneous sharing of content and ideas' (Comscore, 2015). This paper reports on a longitudinal pedagogic research project using social media to facilitate 'internationalising at home' (Killick, 2014) and increase students' awareness of their own cultural capital by creating an inclusive environment for home and international students to share reflections on the global and local fashion industry (Ryan & Hellmundt, 2005).

Student evaluations, Personal and Professional Development statements and focus group contributions supplement the tutors' reflections on the process so far, which has recently completed its third cycle and will be extended to include Vietnam in 2017.

The success of the global classroom project as a participatory user-led space (Bruns, 2007) has exceeded our expectations, particularly with regard to the fostering of a global attitude:

> *'...the importance of cultural differences within the market place is one of the lessons I will take with me for a long time...' (student feedback).*
>
> *'What I really understood was intercultural communication and support... the beauty od people from two cultures working together voluntarily and giving assistance to each other when necessary' (student feedback).*

Co-Creation as a Sustainable Tool: Changing the Paradigm of 'Fashion Is Novelty' Towards 'Fashion Is Personal'

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KEYWORDS

Co-creation, sustainability, fashion system, emotional value, consumer focussed

ABSTRACT

With fashion we consume meaning to a greater extent than matter. Currently, this meaning of fashion is 'the new'. Fashion is ephemeral and consumers are stimulated to stay up to date with the ever changing trends in order to remain fashionable. With today's advanced technologies, lead times have become shorter and so have the fashion seasons. Collections quickly succeed each other, sometimes only staying in store for a couple of weeks before the new collection arrives.

This has enormously decreased the lifespan of a garment. As soon as a product has lost its meaning, it is discarded. Since fashion's meaning is 'being new', it is discarded as soon as it's not new anymore. Because the fashion seasons have become so brief, a garment will quickly lose its novelty and will be replaced. This has led to overproduction, overconsumption and an immense amount of textile waste. Furthermore, this top-down system of imposing new trends on consumers does not take into account the wishes and needs of those buying and wearing the clothes. Therefore, they quickly become bored or unsatisfied with their clothes.

Some effort is put into reducing the negative environmental effects of fashion production by offering sustainable fashion, for instance made of organic cotton. However, offering consumers sustainable clothing does not mean they will use them longer. If we want to successfully make fashion sustainable, a radical change of both the fashion system and the meaning of fashion is needed.

In my opinion a consumer focussed fashion system is a solution to these problems. In this system fashion will no longer be a top down system based around novelty and trends, but a bottom up system based around personal expression. Clothing is highly personal, we use it to show who we are or who we want to be. If the meaning of our clothing is connected to our personal values, it will keep its meaning much longer than when the meaning is only 'novelty'. Co-creation is an effective tool in establishing this effect. Through co-creation designers can develop fashion, which fits the wishes, needs and values of consumers. By involving consumers in the design process, we can stimulate consumers to create an emotional bond with their clothing. Instead of wearing anonymous disposable items, consumers will be enabled to wear personal, long lasting pieces that have value in their lives. This paper sheds light on different methods and examples of co-creation that will help to create fashion with long lasting meaning.

Introduction

With fashion we consume meaning to a greater extent than matter. Currently, this meaning of fashion is 'the new'. Fashion is ephemeral and consumers are stimulated to stay up to date with the ever changing trends

in order to remain fashionable. With today's advanced technologies, lead times have become shorter and so have the fashion seasons. This becomes visible while shopping, since chain stores as well as luxury brands have increased their collections from the traditional two a year, to six, twelve or even more. At Zara a collection can go from factory to shop within a timespan of two weeks (Lamson-Hall, 2013).

The increased pace of fashion cycles has changed the way we consume clothing. Fashion consumption has increased in recent years due to the high availability of low priced fashionable clothing (Cline, 2012:15-18). This has also impacted the lifespan of a garment. As soon as a product has lost its meaning, it is discarded. Since fashion's meaning is 'being new', it is discarded as soon as it's not new anymore. Because the fashion seasons have become so brief, a garment will quickly lose its novelty and will be replaced. This has led to overproduction, overconsumption and an immense amount of textile waste. Overproduction is most clearly shown by the staggering amount of clothes that are not sold at their full retail price. Thirty percent is sold with discounts and another thirty percent ends up in the outlet or remains unsold (Matevosyan, 2014:84). On top of that, a survey by Marks & Spencer shows that on average people only wear 44% of their wardrobe and own 57 unworn items (Oxfam, 2016). Finally, our textile consumption has led to enormous textile waste. In the Netherlands we throw away 11.7 kilograms of textiles per person, per year (Eyeskoot, 2012:127). In the United States this is even 68 pounds (or 30.8 kilograms) per year (Cline, 2012:248). This top- down system of imposing new trends on consumers does not take into account the wishes and needs of those buying and wearing the clothes. Therefore, they quickly become bored or unsatisfied with their clothing.

Some effort has already been put into reducing the negative environmental effects of fashion production by offering sustainable fashion, for instance made of organic cotton. An increasing number of brands have a separate sustainable line - such as H&M's conscious line – or are completely aimed at sustainable clothing, like the Dutch denim brand Kuyichi. However, simply replacing an unsustainable material for a sustainable one can be seen as a quick fix. Sustainable design in this way is only a symptom-focused approach. Instead of focussing on the real problem, we suppress the undesirable symptoms of our consumption (Chapman, 2005:9-10). Offering consumers sustainable clothing does not mean they will use them longer. How sustainable is a bio-cotton T-shirt if you throw it away after wearing it only a few times? If we only focus on the materials, we ignore the unsustainability of the fashion system itself. In order to successfully make fashion sustainable, a radical change of both the fashion system and the meaning of fashion is needed.

Changing the paradigm

In the process to make fashion durable, the consumer is key. The consumer plays an important part in the duration of the life cycle of a garment. To increase the life of clothing and to cut back on textile waste, fashion brands should listen to the consumer and tailor to their wishes and needs.

The New Design System, developed by Hasmik Matevosyan (2014:24), states that listening to and covering the physical and psychological needs of consumers will result in more loyal and also new customers. This system would also reduce the amount of unsold items, because the garments are tested on a target group during the design process. In this way you know beforehand if garments will sell, thus reducing unsold stock (Matevosyan, 2014:79-84).

Another aspect which affects how long products are used is emotion. We all have something we could never throw away because of the meaning or memory attached to it. In his book 'Emotionally Durable Design' Jonathan Chapman (2005:36) states that we consume meaning, not matter. The products signify the meaning that we consume, but as soon as a product has lost its meaning we discard it. Designers must optimize the sustainability of this meaning in order for the object to last longer (Chapman, 2005:29-56).

Both of these theories focus on connecting the consumer with the product; through involvement in the design process or through a connecting value or emotion. These two theories form the foundation of my thesis that co-creation can be used as a sustainable tool.

When consumers are involved in the production or design process, this creates new values and connections with fashion. Involving the consumer will enable them to create an emotional bond with the garment. Furthermore, consumer involvement will make it easier to connect with the consumer's wishes and needs. With these co-created garments their value is not 'the new', instead it is 'the personal'.

In the ANTI_FASHION manifest by Lidewij Edelkoort (2015) I see the sentiment that will lead to the paradigm change from 'fashion is new' to 'fashion is personal' and the increase of co-creation. In this manifest Edelkoort (2015) declares that fashion is dead.

Instead she predicts that 'clothes' will dominate the future and take over from 'newness' and 'change for the sake of change' (Edelkoort, 2015:3,7). Fashion is the embodiment of the new, while clothes are the embodiment of the personal. Fashion are the trends that are imposed from above, while clothes are the items we pick ourselves. Fashion is an unattainable ideal, while clothes are the reality of our lives and the reflections of our personalities.

In stating that clothes will take over from fashion I see the prediction that fashion/clothing will get a more personal connection with consumers. This is also illustrated by Edelkoort's statement that: 'The consumers of today and tomorrow are going to choose for themselves, creating and designing their own wardrobes' (2015:7). The beginnings of the paradigm change from 'fashion is new' to 'fashion is personal' are already felt and co-creation can be a tool to further establish this change as well as to establish a more sustainable attitude towards clothing.

Co-creation

In order to discuss co-creation further and to be able to look at case studies of co-creation, a definition of co-creation is needed. For the purpose of this paper I have set the definition of co-creation as: *"A process in which consumers are actively involved in the designing and/or producing of the garment. Consumers can for example be involved by participating in idea development, designing, customizing and/or producing."*

In a co-creation based system fashion will no longer be a top down system based around novelty and trends, but a bottom up system based around personal expression, experience and value. Clothing is highly personal, we use it to show who we are or who we want to be. If the meaning of our clothing is connected to our personal values, it will keep its meaning much longer than when the meaning is only 'novelty'. Co-creation is an effective tool in establishing this effect. Through co-creation designers can develop fashion, which fits the wishes, needs and values of consumers. By involving consumers in the design process, we can stimulate consumers to create an emotional bond with their clothing. Instead of wearing anonymous disposable items, consumers will be enabled to wear personal, long lasting pieces that have value in their lives.

Case studies

For this paper I have defined four types of co-creation in fashion; producing, brainstorming, customizing and co-designing. With producing the consumer only buys the design, but makes the product himself. A personal connection with the garment is established through effort that goes into the creation of it. Brainstorming co-creation takes place at the very starting point of the design processes. Consumers are interviewed or fill in questionnaires to find out which requirements the products should meet. Customizing is the process of co-creation where a curated design environment is offered to the consumer. The consumer has several options to its disposal to personalise the garment. Co-design is the most radical type of co-creation and differs from customizing in that it has unlimited options, instead of curated options. In co-design designer or brand and customer combine their ideas and inspiration to create a garment or outfit.

Producing at home as co-creation: The Post-Couture Collective [14]

The Post-Couture Collective is a fashion brand that focusses on selling digital design files. Customers then buy their own fabric and visit their local Makerspace to produce the pattern pieces on a laser cutter. As a last step the customers assemble their garment. The pattern pieces are designed in a way that no sewing is needed. An innovative construction is used in the seams, which allows customers to easily assemble, disassemble and reconfigure the garments with pattern pieces in other colours or materials. Customers can also order the garments as a construction kit. In these kits the fabric is already cut and the pieces only need to be assembled.

Figure 1. The innovative construction used by The Post-Couture Collective, Photography: Olya Oleinic (2015).

All the designs are open source. This means that after purchase the customer can edit the digital design files to fit their own wishes and needs. The Post-Couture Collective actively encourages customers to do this and to share their adapted designs with the public.

Through the process of the Post-Couture Collective the consumer gets involved with the product by engaging at an essential stage; the production. Although the garments can also be bought as a construction kit, it is more than just an Ikea package. The customer can be their own manufacturer and is able to select their own fabric, create the pattern pieces and assemble the garment. The customer invests time and creativity into the garment which sustains and lengthens the garment's emotional durability (Chapman, 2005) and therefore also lengthens its lifecycle. The possibility to adapt the digital design files gives even more freedom and options to make the garment fit with the wishes and needs of the customer.

Brainstorming as co-creation: Verhip [15]

Verhip is a brand which sells baby clothes that are developed in collaboration with the parents of young infants, following Matevosyan's New Design System (2014). Verhip starts its design process with a dialogue with their customers (the parents). They ask the customers what they would like to see in baby clothes, what their experiences with baby clothes are and what practical issues they have encountered with these kind of products. All this input is used for the development of the garments. From their questionnaires came the result that the main wishes of the parents are that the baby clothes are easy to put on and take off and that the clothes are comfortable for the baby. They then used these wishes as the starting point of the development of their baby clothing line.

Further input from the parents showed that there are different wishes for the clothes when the baby is zero to three months than when the baby is three to six months old. With the younger group parents do not like to put on clothes over their baby's head, while with the older group this is not an issue. This information

[14] Information for this case study has been derived from the website of The Post-Couture Collectie: < http://www.postcouture.cc/> [Accessed: 22 December 2016]

[15] Information for this case study has been derived from the website of Verhip: <http://www.babyverhip.nl/> [Accessed: 22 December 2016]

resulted in different collections per age group adapted to the specific wishes and needs of that age group. Furthermore, Verhip is working on a new functionality on their website, so that parents can share their feedback about the clothes after using them. This will help Verhip to further improve the ease of use of their baby clothes.

With this collaborative brainstorming process, Verhip ensures that their products will be used by adapting them to the wishes and needs of their customers. Of course, baby clothing calls for specific practical options, but the same process could also be used for aesthetic wishes of the consumer. Engaging in a dialogue with consumers will help to tackle the problem of unsatisfactory clothing because they are difficult or unpleasant to use, and will make sure that customers actually use the products they buy.

Customizing: Unmade [16]

Unmade (which started under the name 'Knyttan') is a technology and manufacturing platform that enables brands to offer their customers customisable knitwear through their e- commerce channels. Because Unmade uses a fully automated production system they can offer customized items for the same unit cost and speed as is usual with mass production.

Unmade collaborates with global brands, which can then use their platform and production system, but they have an in-house fashion label 'UMd', which offers customisable garments under their own name.

Unmade offers consumers a curated design environment in which certain parameters have been established by the designer. For example, with the 'Colour Fields' sweater by Kitty Joseph the consumer can chose from four different colour combinations and can change the position of the colours and the print by dragging their mouse over the image. However, the consumer can only change the colours and print, but not the actual design and structure of the sweater. After the customisation process is done, the consumer pays for and orders the item and the sweater is then individually produced for that consumer. This results in a unique garment and experience for the consumer, and since the item is made on order and paid for in advance there is little risk for the company and no unwanted stock is created.

The products of Unmade establish a strong emotional connection with the consumer in two ways. Firstly, the consumer is involved with some parts of the designing through the choices he can make. This makes the garment connect better with the wishes and needs of the consumer and is a form of a visual interview (offering visual options to the consumer) as used in the New Design System (Matevosyan, 2014:62-63), only in this case the visual interview directly results in a garment. Secondly, the consumer ends up with a unique garment produced specially for him. No one has exactly the same item, which attaches a special feeling to the garment. The garment has its own story and emotion connected to it, which adds to its emotional durability (Chapman, 2005), and will therefore last longer than an off the rack, store bought item.

Co-designing: Couture

In my research I haven't yet found a contemporary example of co-design. There are brands that offer an enormous number of options for customisation, but this always stays within the frame designed by the brand. There is no actual collaboration or exchange of ideas between brand and customer.

However, a type of co-design already exists for centuries, namely, couture. The Online Oxford English Dictionary (2016) defines couture as "the design and manufacture of fashionable clothes to a client's specific requirements and measurements". This means that couture is more than 'made to measure', couture is not just made according to the client's specific measurements, but also to his requirements. At the time when couture was the main production process of clothing, customers visited dressmakers. These dressmakers

[16] Information for this case study has been derived from the website of Unmade: < https://www.unmade.com/ [Accessed: 22 December 2016]

offered their clients more than just a list of limited options, they also offered them their expertise and advise. These craftsmen often had a personal relationship with their clients, and the design of the garments was a collaborative process between craftsman and customer (BOF Team, 2011).

Visiting a dressmaker or couturier for co-designed clothing is still possible today, but it is infrequent and highly expensive. However, with the innovative rapid producing technologies becoming ever more available these days this is likely to rapidly become more affordable in the near future. For example, the technology used by Unmade (see 'Customizing: Unmade' in this paper) allows them to produce one unique customised sweater for the same price and at the same production speed as one mass produced sweater.

Furthermore, software and digital technologies could make it easier for consumers to co- design clothing and to communicate with the designer. Easy to use design software would allow consumers to translate their ideas and inspiration into designs, and communication programs such as Skype allows them to easily communicate their ideas to the designer without having to visit their studio.

There are also possibilities for co-design with groups of consumers. In this case the role of the designer is more substantial. The designer would then collect the ideas and inspiration of a group of consumers with similar taste, ideas, wishes and needs about their clothing and distils this information to create a collection that suits the group's wishes and identity. This process would result in less personal items, but would have lower production costs while still taking into account the wishes of the people who would wear the clothing.

The New Design System (Matevosyan, 2014) could be used as a foundation for a new system for co-design with individual as well as groups of consumers, since it offers steps to discover, translate and implement the wishes and needs of consumers into fashion design.

In short, modern technologies offer various possibilities to apply co-design in another way than the traditional couture. However, it is not yet used as a new fashion production or design system.

Conclusion

In order to make fashion sustainable we have to part with the idea that 'fashion is new'. In this rapidly changing world the value of 'newness' deteriorates quickly, is emotionally unsatisfactory and leads to enormous amounts of textile waste. Therefore, we have to break with the fashion rule that fashion should be new, and we also need to create a new fashion system and a new meaning of fashion. As this new value I propose 'personal'. To be able to change the paradigm of 'fashion is new' to 'fashion is personal' a new way to approach fashion is needed.

Fashion currently is a top-down system in which the designers of fashion houses and elite trend forecasters decide the trends of the new season and change them rapidly in order to increase sales and consumption. Some trends trickle up from fashion blogs and street style, but consumers aren't yet actively asked for their ideas, input or designs. In this top-down system it is hard for a consumer to create an emotional connection with their garments and their connection to an item is soon lost as the item has lost its newness.

However, in a bottom-up system consumers would be able to create an emotional connection with their clothes. In this new system different kinds of co-creation would be used as a tool to create this emotional connection. Through involving consumers in the design and/or production process they will feel more involved with their garments and will be enabled to wear clothes that they have personally influenced. The values of 'individuality' and 'self-expression' that are created in this system will last far longer than the traditional value of fashion, namely 'newness'. Instead of wearing anonymous disposable items, consumers will be enabled to wear personal, long lasting pieces that have value in their lives.

This paper has discussed several examples and opportunities of how co-creation is or can be used to make fashion more sustainable. Furthermore, co-creation also offers a considerable opportunity for brands to cut down costs and losses. With co-creation items are either payed for before production or they are based on

the wishes and needs of consumers. This would result in less or no unsold stock, which not only reduces the waste the brand produces, but also reduces the costs and losses attached to unsold stock, such as storage costs and losses through discounts.

Some signs of this paradigm change are already visible. The greatest changes are coming from new brands and start-ups, whose companies are already fully immerged in a new fashion system. These brands show that their creativity does not only lead to beautiful clothes, but also to an innovative and sustainable fashion system.

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Different perspectives and paradigms on fashion

Papers & Abstracts

Abstract: an Object-Based Research Study of Archive Pieces Incorporating Digital Technology

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ABSTRACT

This paper deals with the disruptive power of technology by presenting the outcomes of an object based research study where a selection of couture garments from a museum archive were reverse-engineered and then re-created, incorporating digital technology. The purpose was to inform the design and content of an exhibition of the archive pieces. The aim of the study was to explore and develop digital versions of archive material by documenting detailed measurements and translating these into digital patterns, with a view to incorporating 3D animations. This would provide a means of exploring internal and external views, in order to engage and educate a wider audience in the process of making and to the craftsmanship that is hidden in the garment.

As part of the research process, a group of students used their technical skills to analyse the construction of selected pieces of the archive, take detailed measurements of the pieces and manually draft a pattern before re-producing this as a 2D digital pattern. The copy pattern was sampled in calico in order to compare a fabricated sample to the original. The studies of the selected archive pieces were also documented as specification drawings.

As a model for education, the object-based research method showed interesting results. First of all it considered new ways to produce digital versions of archive material; as 2D digital pattern pieces of interest to pattern technologists, and proposing 3D animations which would explore internal and external views, to engage the wider audience. The students benefitted from access to precious couture pieces which presented them with unfamiliar cutting and construction techniques, thus challenging their existing education of technical skills.

Experimenting with the patterns in a digital format presented limitations to the finish of the patterns, which are not present when a pattern is manipulated using bespoke couture techniques. Significantly, the means to evidence the construction and product development process alongside finished work, contributes to evidencing an individual's deep understanding of the technical processes.

Abstract: Virtual Reality Technology on Protection and Inheritance for Traditional Tibetan Clothing

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KEYWORDS

Virtual reality technology, traditional Tibetan clothing, protection and inheritance, CAD software for garment, three-dimensional model

ABSTRACT

The special nature and geographical environment created a unique Tibetan clothing culture. Nevertheless, the traditional Tibetan clothing is gradually assimilated by the culture of Han ethnic group and western country under the influence of culture and economic globalization. Therefore, the protection and inheritance for traditional Tibetan clothing is imminent. Nowadays, digital, internet and mobile communication technologies become the representatives of the new media with information widely spread out in various forms. Due to the changes in mass and communication media, the propagation of traditional clothing culture using the old way of exhibitions, such as physical static exhibition in museums and reports from paper, becomes unpopular. With virtual reality technology, the three-dimensional virtual presentation of "from reality to virtual reality and then back to reality" and a new way of clothing culture propagation of "traditional clothing enters mobile client" become popular. Using computer technology, this paper studies various digital processing for the traditional Tibetan clothing samples collected from museums and field trips. These processes include gathering the related information of clothing samples first, recording the measurement of each part and structural characteristics, and taking photos from multiple perspectives. Then CAD software for garment is used to produce the two-dimensional clothing pattern through the analysis of relevant structural information. Later image-processing software is used to process the fabric images and simulate the texture surface characteristics of Tibetan fabric such as PU LU and gold-wefted brocade to present the physical characteristics including degree of softness and drapability. Finally, a three-dimensional model of traditional Tibetan clothing is created. This paper aims at establishing a complete system of three-dimensional traditional Tibetan clothing model through 3D virtual simulation show for different sublines and types of Tibetan clothing. The method of using new media technology could lead to a better protection and inheritance of traditional Tibetan clothing.

Consumer Acceptance of Smart Textiles: a Human-Centred Approach to the Design of Temperature-Sensing Socks

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KEYWORDS

Smart textiles, temperature sensing yarn, electronic health applications, human-centred design, participatory action research

INTRODUCTION

'Breaking the rules' of fashion may require new thinking and practices that contribute to a healthier, better, and more prosperous world for everyone. In part this can be realised by drawing on knowledge from different disciplines and the building of new collaborative partnerships. One promising partnership lies in the rapid advances in information and nano-technologies and the opportunities they provide to transform clothing and concepts of fashion.

This paper examines the application of information technology and material science to smart textiles and how they may lead to healthier lives for a large and growing population. Diabetes is a significant health threat, with the number of people diagnosed in the UK doubling since 1996 (Diabetes UK 2015) The disease has debilitating and life-threatening consequences and diabetics are prone to develop foot ulcers, which may lead to complications, including amputation. Temperature changes in the feet are a good predictor of ulceration, and patients and their clinicians will benefit from an early warning system that can detect changes. This paper explores the user experience, comfort level and the physical properties of temperature-sensing socks (TSS) that use temperature sensing yarns.

To measure the physical characteristics of the socks two different methods were used in a participatory approach with the stakeholders. These were a wear trial with potential end-users and second, a focus group to discuss the wear trial results with stakeholders, who included the developers of the socks, designers, fashion marketing researchers and participants of the wear trial. Each method was chosen as a way to engage with different stakeholders to enable them to discuss their experiences, their knowledge into the research process and thereby gain new perspectives and insights to the project.

Literature review

Smart textiles are determined by electrical, thermal, mechanical, chemical, magnetic and other elements, that sense and communicate conditions and stimuli between the wearer and the environment (Tao 2001). E-textiles are a subset of this group, and consist of "clothing or technical textiles with electronic components integrated into them" (Kohler et al. 2011, p.497). The production of electrical and electronic textiles are primarily defined by insertion and integration techniques, inserting pre-packaged electronics into pockets, stitching components to surface of the textile, and integrating functionality into the textile using conductive threads, printing technology and integrating electronics into clothing accessories, such as belts (Cork et al. 2013).

The application of smart textiles to healthcare follows the adoption of best practices in health care innovation (Thakur et.al. 2012). Implementation of those practices ensures patient safety and optimises outcomes by helping health care professionals (HCP) to work smarter, faster, better and more cost-effectively. Connected health or technology embedded care (TEC) involves the convergence of healthcare technology, digital media and mobile devices. The successful development of smart textiles from research and development to market (Park & Jayaraman 2010) depends on understanding user's needs and how they can be met, reducing cost and improving the quality of service or performance, and enhanced convenience. Furthermore, the adoption of an innovative product is affected by its relative advantage, compatibility, complexity, observability and trialability (Rogers 2003). Therefore, the ability to observe how others are using the innovation and opportunities for trial can overcome the barriers and increase the chance of adoption (Park & Jayaraman, 2010).

An important innovative component of TSS (figure 1) is temperature-sensing yarn in which nano- sensors are glued in polyester copper yarn encased in a tubular knitted sleeve and then woven into the socks, a data processing box for wireless communications and a battery energy supply.

The sensors are integrated in the temperature-sensing yarn (TSY) and woven into the socks to acquire body temperature information from the individual and environment. The communication system in the yarn then transmits the data to an application in a smart phone for storage and analysis. This knowledge- based decision support system can help health care professionals to interpret the data, diagnose the individual's condition and develop an appropriate treatment administered in a timely manner. The treatment can be initiated by an individual, health care professional or triggered automatically by the monitoring site if the user is unable to respond to data or has previously authorised an automatic intervention (Park & Jayaraman, 2010)

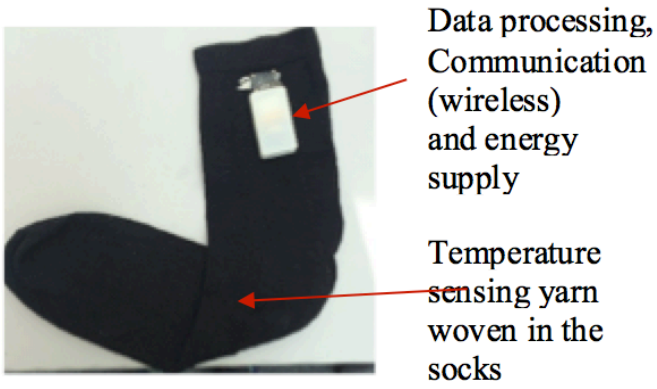


Figure 1: Temperature sensing socks

However, there are various barriers to the development of TEC, including widespread concerns about quality, reliability, data overload, privacy and security. Another problem is that HCPs are often reluctant to engage with technology mainly due to the scale and pace of change, lack of education and training and concerns over liability and funding (Deloitte, 2015). Data privacy and how data is stored, shared, handled and accessed to the benefit of everyone has become an important issue (McKernan 2016). Concerns about cost effectiveness can be reduced by improving the quality and reliability of the devices and applications, and reducing the cost of digital technology (Deloitte 2015). For example, technologists' learning from the data, the modelling of data and simulations can make the technology more accessible and as a result make it more affordable and available for end users (Green 2016).

Methodology

The research question that arises is: what causes the participants to accept or reject temperature sensing socks? The study is conducted in a real world setting, where there is a need for the researcher to work with participants in a collaborative process aimed at improving and understanding their world in order to change the system. Participatory Action Research (PAR) was chosen for its cyclical process of exploration, knowl-

edge construction and implementation (McTaggart, 1997). PAR is a recursive process that involves a spiral of adaptable steps in four stages to:

- Question the issue of user acceptance of temperature sensing socks in two ways: socks with and without sensors during a wear trial
- Reflect on and investigate the wear trial results
- Develop an action plan combining qualitative and quantitative methods
- Review the physical characteristics and marketability of the socks with different stakeholders in a focus group

In order to test the physical properties of the TSS, a wear trial was undertaken with six participants and the results were discussed in a focus group of ten participants to examine the results and sales opportunity of the socks. The research was designed to test the user acceptability of the temperature sensing socks in terms of physical characteristics, rather than the diagnostic properties.

Product design

An understanding of the design of the TSS and the placement of sensors in the TSY was gained through the researcher's involvement in the development of the mock TSS. The purpose was to create fourteen pairs of socks for wear trial, half of which had sensors and the other half had none. The sensors were fixed to a polyester fiber and copper wire and encased within a yarn 'sleeve'. The sensors constantly measure the temperature of the feet and if the temperature starts to reduce then this can be a possible indication of developing ulcers. The sensors were encased in TSY and the sensors were marked green to identify the sensor position in the socks (figure 2). However, the sensors were not activated in the mock TSS used for wear trial.

Temperature sensing socks with sensors

The socks were knitted on a computerised knitting machine using 10 gauge 50/50 polyester cotton yarn, and the top rib was combined with spandex or lycra for increased elasticity. The knitting process included creation of channels in the bottom of the socks into which the temperature sensing yarns were woven. In order to incorporate the temperature-sensing yarns into the socks, the sock was put onto a dummy foot; the sensor points on the dummy foot were then mapped onto the sock. The different orientations of the sensors for left and right feet were marked separately in each pair of socks

The TSY were woven into five channels knitted in the bottom of the socks and the sensors were exactly positioned in the marked area in seven pairs of dummy socks. The remaining seven pairs were woven with TSY that did not include sensors.

Figure 2: Temperature sensor yarn (TSY)

Attaching dummy data the processing box to the TSS

The temperature-sensing socks included a data processing box containing circuitry and batteries. This enabled communication between the sensors in the socks and a phone. Circuitry and electronics boxes were created for the dummy socks used in the trial to give them equivalent weight and feel to functional socks. In order to achieve this, the ends of the TSY were glued to strips of circuit board. The strips were hidden under a hand sewn pocket right below the top rib of the sock.

For the non-sensing socks, a small, plastic box of similar weight and size to that used in functional temperature-sensing socks was then added. To ensure that the weight of the boxes was equivalent to those used in functional temperature-sensing socks, the circuit components and batteries for energy supply were weighed and replaced with an equal weight of plasticine. This was then placed in the pocket at the top of the socks. Velcro was attached within the pocket opening to avoid the data processing box slipping out of the pocket. The final TSS used for wear trial is shown in figure 3.

Methods for data collection

The data collection methods involved a series of practical investigations to measure the physical characteristics of the dummy socks with and without sensors. Research related to the adoption of innovations suggests a prominent role for perceived ease of use. Perceived ease of use is defined as the degree of which a person believes that using a particular system would be free of effort (Davis et.al. 1989). From this definition, we claim that the temperature sensing socks is perceived to be easy to use and comfortable, which is more likely to be accepted by users.

Figure 3: Temperature sensing socks developed for wear trial

Usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use (ISO 9241 DIS 1994). According to Sande (1999) iterative modelling and evaluation is a good tool for ensuring usability and likability. In the design process the decision makers need information on which their decisions can be based. The reasons for modelling and prototyping fall into three broad classes: idea generation, communication and testing (Sande 1999). Of the three, testing is most important as the preferences concerning design solutions can be tested and evaluated with real users. Usability testing can be applied to small scale user studies with rough prototypes at the concept creation stage, or formal usability testing with elaborated prototypes or semi-finished products in order to get the product details right and to see if the goals have been reached.

The prototypes were tested with stakeholders, colleagues and most importantly with users. Models and prototypes can be high or low fidelity. High fidelity models are finished and detailed and resemble final product closely. Low fidelity models are visually rough or represent only certain features of the product. Virzi et.al. (1996) argues that the usability problems can be effectively identified with low fidelity prototypes that will drive the innovation process:

"The user experience (UX) is the totality of user's perception as they interact with a product or service. These perceptions include effectiveness (how good is the result?), efficiency (how fast or cheap is it?), emotional satisfaction (how good does it feel?) and the quality of the relationship with the entity that created the product or service (what expectation does it create from subsequent interaction?)" (Kuniavsky 2010, p:14).

Identification of usability and acceptance dimensions for temperature sensor socks

Totter et.al. (2011) used the term 'dimensions' from Fensli and Boisen (2009) to describe the user's experience and feeling of wireless sensors. These are sensor efficiency and reliability, medical aspects, wearability and affective aspects (Totter et.al. 2011). This study does not address the diagnostic part of temperature sensing socks; accordingly, the two dimensions were chosen to review the wear trial results were wearability (SW) and affective aspects (SA).

Wearability (SW) is evaluated by studying the daily comfort during physical activities. The fitting of the TSS is an important attribute to determine the overall wearability of the socks, and the two attributes measured in this dimension were comfort and fitting. Affective aspects (SA) the perceptions of wearing the sensors, depends on social acceptance, personal style and look. The image aspects, personal identification and motivational aspects were also evaluated.

Wear trial and focus group were used for data collection. The empirical data from the wear trial was discussed in the focus group involving the developers of TSS, participants, designers and academic researchers. The focus group discussion emphasised the wearability and affective aspects of the socks that could contribute to research that will drive the innovation process and identify sales opportunity for the socks.

Data collection and analysis

The wear trial used six participants, two men and four women, aged 28-48. Individual participants were given general information about the TSS and clearly explained that diagnostic part of the socks not tested and the sensors were not activated. Each participant was given two pairs of socks: pair A without sensors and pair B with sensors. Socks with sensors and without sensors were kept anonymous from the participants in order to measure variation in wearability dimension between the two pairs. UK size 7, TSS were used for experiments, and the shoe sizes of participants were between UK size 5 - 9.5. The fibre content of the TSS used for the experiment were 50/50 white polyester cotton. Two wearer assessment forms for each types of sock were given to participants to record their wear trial experience.

The socks were worn by each participant for 100 hours split evenly between the two types. The wearers were asked to answer questions related to wearability and affective aspects for both pairs of socks, before and after wash and explain their experience using photographs. Participants were advised to wash the socks in 40°C and no tumble dry. A Likert scale was used to measure the participant's acceptability of TSS socks before and after wash.

Wearability dimension (SW)

The two attributes in this dimension were comfort and fit. The comfort attribute factors were easy to put on and take off the socks, widthways stretch, physical irritation (due to sensor abrasion) and overall comfort. The comfort factors before and after wash of pair A and pair B were charted in figures x and y.

The problems identified by participants of wear trial related to comfort started on the first day when five of the participants found it difficult to put the socks on. The four female participants were unhappy with the overall fit of TSS before and after washing. On the second day, the socks were loose at the ankle even before laundering. However, as the socks became floppy they became more comfortable, but this also caused the sensors to move away from the sensor points under the feet. Conversely the top rib became tighter after each wash which made them more difficult to take on and off. All participants complained about the

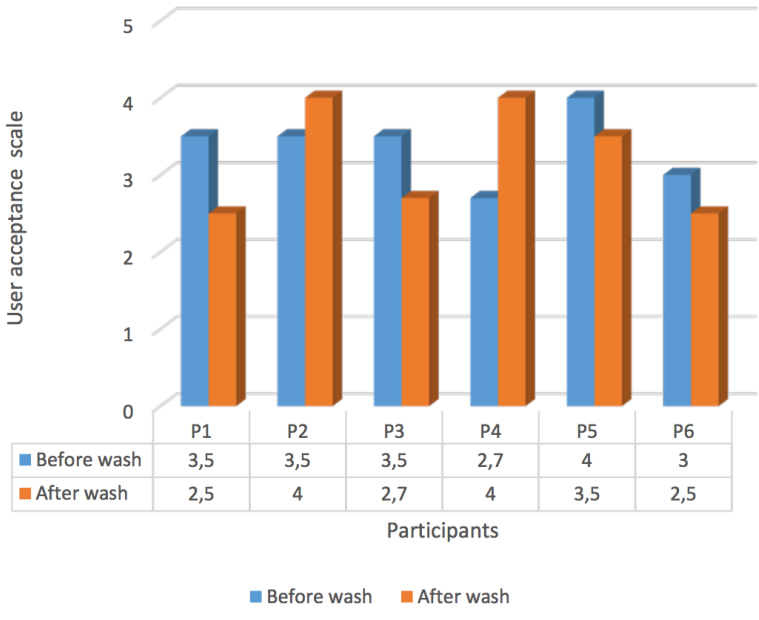


Figure 4 Comfort factors of Pair A (without sensors) before and after wash

size of data processing box and its placement. They had to remove the data processing box in order to put on the socks and the hand sewn pockets frayed after first wash.

The participants were not happy with the fiber content and the thickness of the socks in the sole where they are woven in knitted channels. Four female participants experienced discomfort from the sensation of wearing them and from itchy sweaty feet. The physical irritation factor was described as

> *"....the socks felt 'granular' the feeling was not uncomfortable, but more like wearing a fitness sole that is indented to massage the base of the feet. But at the end of the day I was really pleased to take the socks off and not to feel the lines of pressure underneath my feet ".*

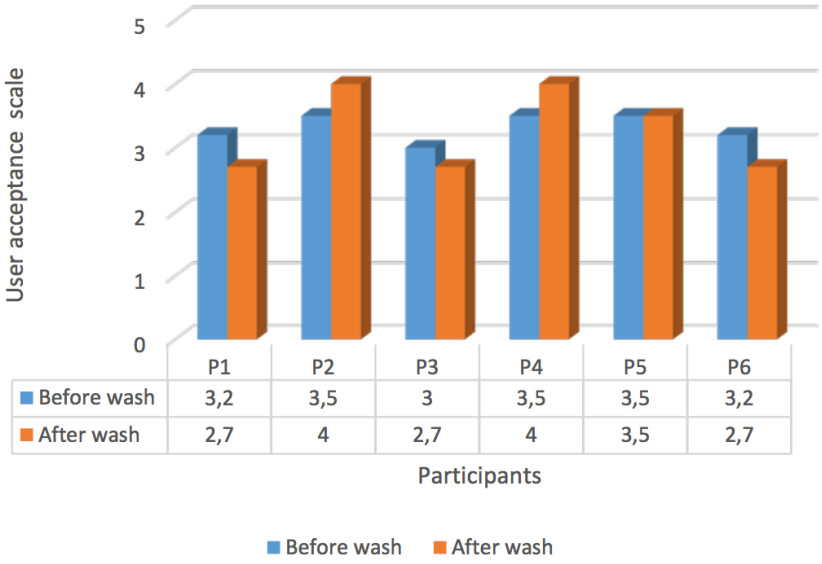


Figure 5: Comfort factor of Pair B (with sensors) before and after wash

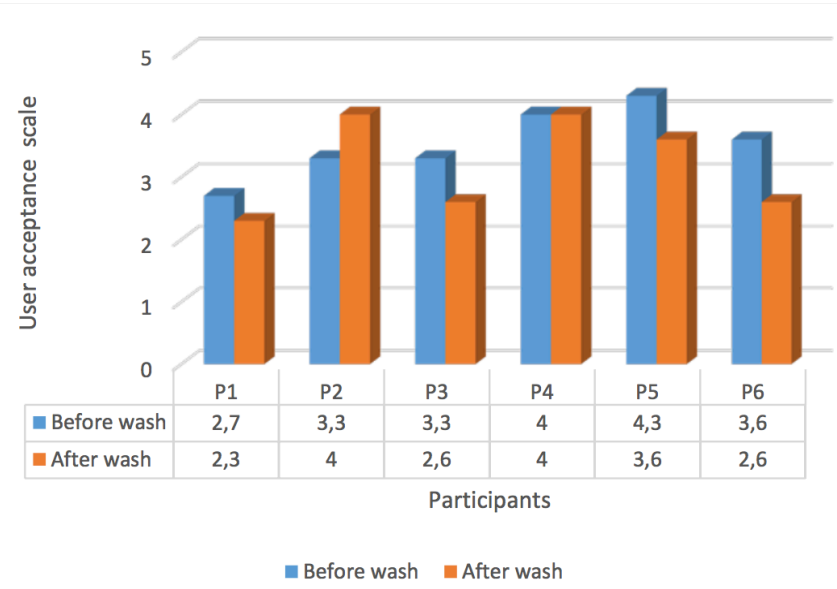
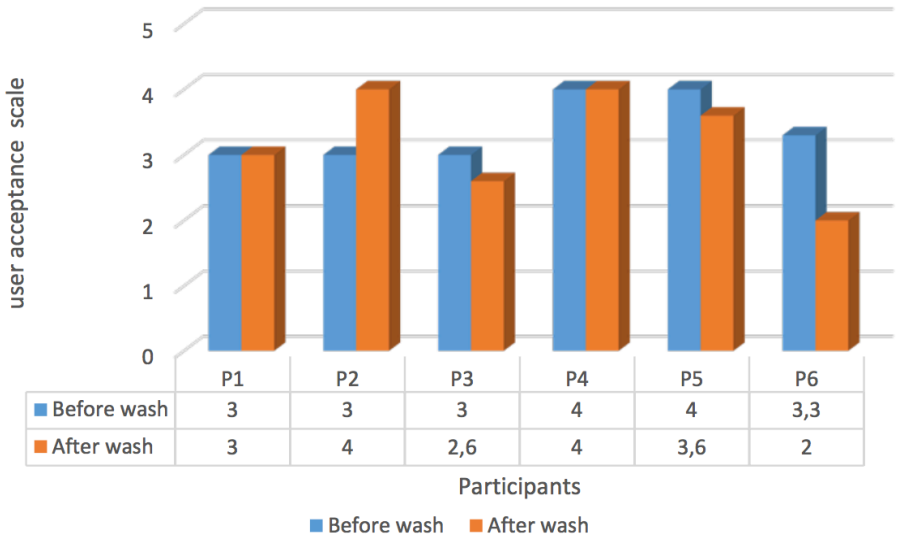


Figure 6: Fit factors of Pair A (without sensors) before and after wash

The factors under fit attribute: fit at the heel and ankle, top rib and overall fit. The fit factors before and after wash of pair A- without sensors (figure 6) and pair B- with sensors (figure 7) were plotted in two charts.

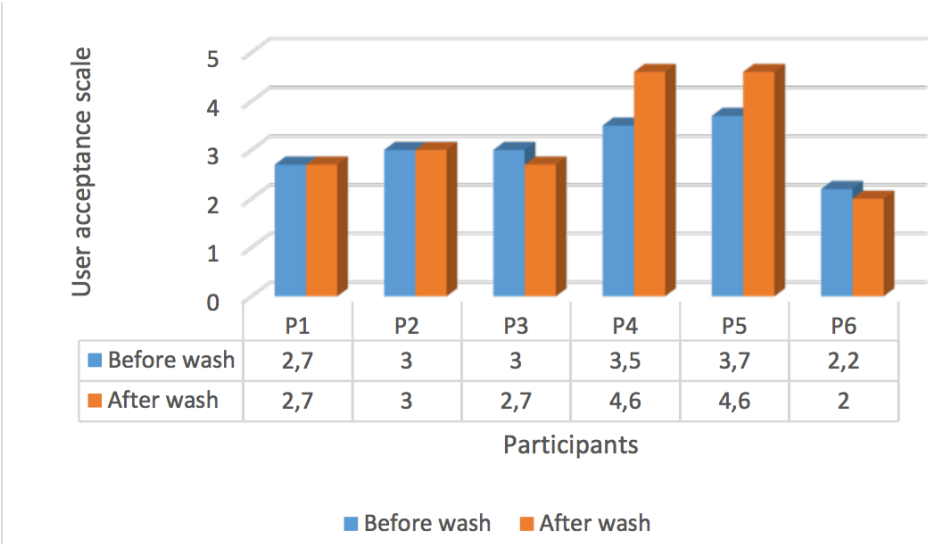


	P1	P2	P3	P4	P5	P6
Before wash	3	3	3	4	4	3,3
After wash	3	4	2,6	4	3,6	2

Figure 7: Fit factor of Pair B (with sensors) before and after wash

Affective aspect (SA)

The factors under affective aspects were personal style, look and feel (overall appearance), and motivation. The affective aspects before and after wash were plotted in the charts (figure 8):



	P1	P2	P3	P4	P5	P6
Before wash	2,7	3	3	3,5	3,7	2,2
After wash	2,7	3	2,7	4,6	4,6	2

Figure 8: Affective aspect factors of Pair A (without sensors) before and after wash

Participants were not happy with the overall appearance of the socks. Some participants wore additional socks to cover the data processing box and it prevent it from slipping from the pocket and velcro was used as a temporary solution to stop the dummy data processing box slipping out of the pocket. The female par-

ticipants were concerned about choice of clothing due to the unsightly bulge of the data processing box; consequently the socks were only worn with trousers. All participants agreed that the socks lacked styling, with one commenting that:

> *"...even though they are not socks for fashion, I think because of what that represent they must be visually appealing, so that the wearer does not feel that, she is wearing it only because of the medical implications".*

The socks were white, which made it difficult to remove the stains and they had heavy pilling at the bottom and ankle.

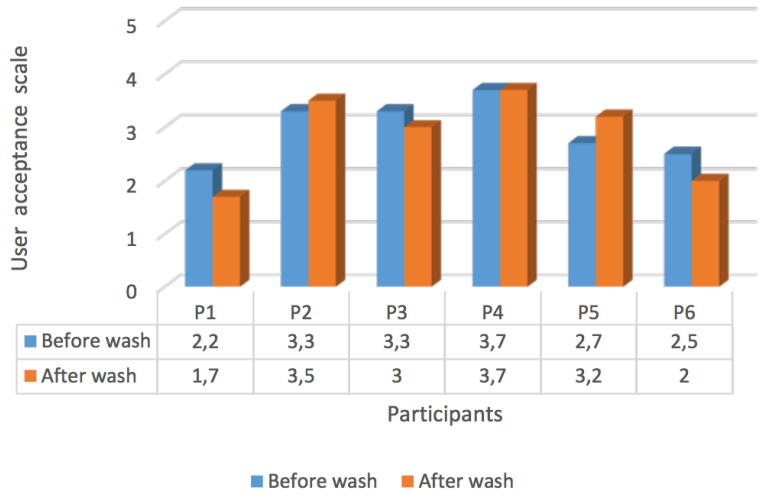


Figure 9: Affective aspects factor of Pair B (with sensors) before and after wash

Validation of the wear trial

Since the wear trial was an evaluation process for TSS it was important to discuss the trial results with potential stakeholders to validate the method applied. A focus group of six male and four female stakeholders was organized, purposively selected as developers of the socks, designers, fashion marketing researchers and from the wear trial. The event included presentations of mockup samples of TSS used for the wear trial, original samples of TSS, a design process book of TSS mock samples and a power point presentation about the TSS, it's medical application and wear trial results. The discussion was audio recorded and analysed.

The findings demonstrated a concern about the number of participants selected for the wear trial. The main constraint on numbers in the trial was the four month project time-line and that it took more than a month to complete the socks. The results of the focus group were categorised into critical elements with their corresponding user experience factors. The results were then used to validate and enrich understanding of the wearability and affect aspects of the TSS; Table 1 summaries the problems and solutions discussed in the focus group.

Table 1-1-2

User experience dimension	Problems	Solutions
Wearability Fit	TSS size 7 was a perfect fit for UK size 6 and size 9.5	'Scan to knit' is a method that could be carried into this project. It would then make the socks into a more bespoke item Currently technologists are working on automating the complete process, not on hand crafting the socks
	The body of the socks sagged and flopped that made the heel of the socks not aligning with the wearer's foot	The fibre content and design of the socks should be revised in order to resolve the fit and comfort problems
	Fit problems will question the accuracy of reading the temperature from the feet as the sensors were no longer positioned correctly	There are certain specific points for temperature sensing under the feet. The sensors are very small chips that can sense the temperature from an area (figure 10). It is not necessary that the sensors should be placed in the exact position, a slight change in the position will not affect the reading.
Comfort	Experiencing rash and itching under the feet	Further research should go into reducing diameter of the TSY to lessen discomfort while wearing the socks
	Participants with diabetics are slightly older profile and have problems getting their socks to feet	There are socks in the market that are designed with fairly loose structure like M&S fresh feet non elastic socks. They are designed well with beautiful patterns. Technologists can collaborate with professional socks companies to rectify the design problems
Affect aspect Style (look and feel)	The styling of the socks was not up to the participants liking	The design of socks should be completely revised in order to market the product
	How do we make the data processing box acceptable for the wearer?	The sensor devices could be embedded in an insole that could be placed into the shoes. The data process unit and the batteries could be placed under the longitudinal arch of the feet where there is no pressure. Another proposed solution was proximity sensing that could be in the insole which then senses the temperature changes

User experience dimension	Problems	Solutions
Personal identification	In order to collect data, the participants have to install a specific application in their phone. If cost is implied for an app, then that should be considered. If you share an app then there is an issue of data sharing	Along with the technology and design developments, data security is an important issue that should be taken to consideration
Marketability	The socks used for trial were handmade and lot of work was put into it, that automatically increases the price of the product Mass production in Asian countries made cheap price expectations for socks	Price does have an impact on people's acceptability of the product. It is important how we communicate the benefits of the socks clearly to the consumers. The consumers are often willing to pay premium price if they can see the real benefits of the product
Price		
Selling point	Identifying the main technology aspect of the socks	The technology developed for temperature sensing yarn can be used in something other than the socks
Endorsement	Because it is a health care related product it needs professional endorsement	When technology is related to health, it is a serious topic. It needs professional endorsements from the national health service, diabetics groups and leading diabetic charities that will give the credibility required for TSS

Findings

The temperature sensing socks (TSS) demonstrates a significant scope for temperature sensing yarn (TSY) in healthcare. However, the ability to attract consumers to adopt this technology is crucial for technology developers and designers. The project explored the physical factors that affect consumer's adoption intentions towards smart textiles in healthcare and the implications for product design. The product should be easy to use and without obstructions; the materials should be soft and comfortable, the products designed using smart textiles should be wearable and aesthetically appealing to encourage use.

Studies about wearable health care devices have conceptually stated some critical factors or experimentally examined a limited number of important factors from technology perspective (Claes et.al. 2015; Steele et.al. 2009). This research empirically investigates user experience of smart textiles in health care. Moreover, the trial reveals that socks with sensors (pair B) caused skin irritation for some participants. However, male and female participants provided different feedback from the trial. The male participants were satisfied with the wearability (SW) of the socks and not happy with affect aspects (SA). On the other hand all four female participants were unsatisfied with wearability (SW) and affect aspects (AS).

Apart from the technology perspective, the study explored factors that influence the consumer's intention to adopt smart textiles in health care and privacy perspectives, which is expected to provide assistance for future smart textiles research. This research indicates that future empirical studies about smart textile adoption in health care should consider factors from multiple perspectives such as technology, data protection, collaboration with professionals in health care sector, product designers and potential end users.

Conclusion

In seeking to 'break the rules' of fashion this paper has explored the role of new technologies in smart textiles. First, it enables new questions to be asked about fashion in the conceptualisation of communicative wearables and the problem of language, to define – using a material cultural term – stuff. While socks were designed for the project, they are clearly not conventional socks, in a small part because of the smart textile itself, but largely because of the need to accommodate the communication and battery unit. So the functionality of the TSS at this stage of development contributes to the design of a different sock-like object. 'Affordances' can be used to describe actionable qualities of design in an environment, and in this study the generally accepted affordance of a sock has been extended by both its qualities and environment. The hidden communicative qualities of its smart textile itself and the more visible if enigmatic added power supply pocket. The conventions of a 'sock' as a foot covering for comfort, hygiene and social acceptability, were modified by the need to communicate changes in foot temperature.

Moreover as technology replaces many of the designers' tasks, new models of consumer awareness of global fashion trends are required to facilitate the design of the final product. As the focus group demonstrated, consumers are willing to pay a premium price if the product can satisfy their functional and aesthetic needs. In this case, designs that account for the aesthetic requirements of the consumer will encourage adherence to its medical use (Bush and Kent 2017).

Second, the rules are challenged by the interdisciplinarity required to integrate smart technologies with fashion. From the outset of a smart textile project this may involve an understanding of textiles, information technology and engineering disciplines, a need to work within the constraints they impose and different approaches to teamwork. The whole concept of a fashion project may change, for example with the need to access experimental materials and equipment situated in another discipline. In this project, the samples had to be hand-made so the possibility for rapid prototyping did not exist, and opened up new possibilities for fashion as crafting and materiality.

Finally, the project challenged the conventions of fashion education through its focus on healthcare and more general wellbeing. Healthcare products tend not to be found in the mainstream of the fashion industry and if wellbeing is to become a more important element of fashion, then it needs to find a particular place in the curriculum. By researching the development of a new product for monitoring diabetes, this project can contribute to the design of fashion courses and their content, and more profoundly to the boundaries of fashion.

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Defining Fabric Drape

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KEYWORDS

Fabric-drape-category, identifying key-word, 3D-virtual-technology, garment-simulation, virtual-drape.

ABSTRACT

This research aims to obtain more insight in the perception of fabric drape and how fabric drape can be categorized

With the current 3D virtual technologies to simulate garments the fashion and clothing industry can speed up work processes, improve accuracy and reduce material consumption in fit, design and sales. Although the interest in 3D technology is increasing, the implementation on a large scale emerges only slowly. At the threshold between physical and virtual fitting the fashion industry faces new challenges and demands requiring responses out of rule. The measurement of fabric drape started in the first half of the previous century, after the introduction of 3D garment simulation fabric drape gained interest from more researchers to obtain information for the virtual drape. Intensive research has been undertaken to define 'fabric hand', however, research is limited for the definition of fabric drape. Better understanding of how fabrics drape and how they can be selected based on their drape might contribute to the understanding of the virtually assessed material and accelerate the selection process of virtually, as well as digitally presented fabrics.

For this research the drape coefficient of 13 fabrics, selected based on their drape, was measured with the Cusick drape tester. Images and videos of the fabrics draped on pedestals were presented to an expert textile panel who were asked to define the fabric drape. From these definitions categories, as well as identifying key-words, were derived. During a group session the expert panel evaluated the drape categories and identifying key-words. In the next phase an expert user panel, familiar with the assessment of fabrics in a virtual environment, assessed the appropriateness of the categories and identifying key-words which were presented along with the fabric drape images and videos. Moreover, both panels judged the stiffness and amount of drape, next to that they indicated similar draping fabrics. The relation between the subjective assessment of drape and the drape coefficient was investigated.

The agreement of the user panel with the drape categories defined and evaluated by the textile panel was high. Further, the agreement of the majority of the user panel with the identifying key-words was above 78%. A strong relation was found between the measured drape coefficient and the subjectively assessed stiffness and amount of drape. Additionally, the analysis of the fabrics combined by the panels based on drape similarity, as well as the analysis of the drape coefficients, confirms with previous research, that significantly different fabrics can have a similar drape.

Fabrics can be divided in drape categories based on the way they drape, and the identifying key-words are useful to distinguish between significantly different fabrics with similar fabric drape. Moreover, the categories are related to the drape coefficient.

Introduction

> *"A piece of fabric may be supported in some parts and not supported in other parts. Such a fabric will be subjected to forces from the supports and to forces from the gravity. The description of the fabric deformation produced by these forces may be called the drape of the fabric" (Cusick, 1962, p. 1).*

With dedicated software three-dimensional (3D) garments can be simulated in a virtual environment. Research and development in this technology started in the 1990's and enabled the fitting of virtual garments on a parametric Avatar to facilitate the industry, or on a body scan to ease bespoke tailoring (Hardaker and Fozzard, 1998). Two-dimensional (2D) patterns are with the 2D to 3D method simulated around the virtual human based on objective fabric properties (Sayem, Kennon and Clarke, 2010). The fashion industry can make a headway by implementing 3D virtual technology, virtually simulated garments can contribute to work more accurately and to reduce time and costs during the development and sales (Volino and Magnenat-Thalmann, 2000; Luible, 2008; Pandurangan et al. 2008; Kuijpers and Gong, 2014). Moreover, costume design (Portland, 2015) and customized tailoring (Tao and Bruniaux, 2013) could benefit from this technology. Nevertheless, implementation is slow. (Volino and Magnenat-Thalmann, 2005; Luible, 2008 pp. 3-4). For the fashion and clothing industry accurate and exact representation of the virtual garment is key for a successful integration and replacement of the real garment, the technical accuracy and aesthetics relies on precise fabric mechanical and physical properties (Luible, 2008, p. 5).

The highly anisotropic fabric (Pierce, 1930) drapes around the body or stands from it based on material properties and weight (Cusick, 1962, p 1). In the traditional way of working fabric drape is judged by combining senses, the eyes register lustre, shape and drape, the hands the haptic experience and weight of the material, whilst the brain associates and connects these senses. Fabric drape has an important role for the fit and appearance of a garment. Within the current emerging applications for virtual garment simulation fabric drape has a significant part in assessing the simulated garment. Interaction between real and virtual material requires insight in the real material and the fabric's mechanical and physical properties and how they effect the drape. At the threshold between physical and virtual assessing of fabric drape new skills and rules apply, disruptive to traditional design processes. Taking 'the next step in fashion' (Bruylant, 2016) designers break with traditions by experimenting with the virtual fabric drape through adjusting the fabrics' mechanical and physical properties, as illustrated in Figure 1 by design student Sarah Bruylant.

a b

Figure 1: New design skills: (a) experimenting with fabric drape through adjustment of material properties, (b) photoshoot real dress (Bruylant, 2016).

The purpose of this research is to obtain more insight into fabric drape and the perception of fabric drape, and is part of a larger research concerning the evaluation of physical and virtual fabric drape created from

objective fabric properties. A theoretical frame work is created through literature review and subjective and objective data are acquired, the latter by empirical testing and the former through surveys and structured interviews. The relationships between the subjective and objective data are statistically examined.

This paper will demonstrate whether fabrics can be classified into categories based on their drape. To the authors' knowledge, limited work has been carried out in this area. Fabric selection from databases in a virtual or digital environment is mostly done based on composition, weight, weave or visuals of the fabric to name a few. Additional options for selection based on drape category will refine the selection process. With the identifying key-words, introduced in this research, the identification of the fabric can be further increased. Furthermore, the different perspectives on the drape presented in this investigation will contribute to the insight in the drape of the digital or virtual material.

Literature review and theoretical framework

Cusick (1965) made a distinction between the visual appearance of fabric drape and the mechanical interactions within the material. He specified the latter: '*The drape of a fabric may be defined as a description of the deformation of the fabric produced by gravity when only part of it is directly supported*'.

The quantification of fabric drape started with the development of drape meters, they enabled insight in the three-dimensional buckling of fabric. Chu, Cummings and Teixeira (1950) discussed typical drape diagrams for sateen and acetate, Figure 2. Moreover, the number and the shape of the nodes give valuable information to characterize fabric drape as Chu, Platt and Hamburger (1960) pointed out.

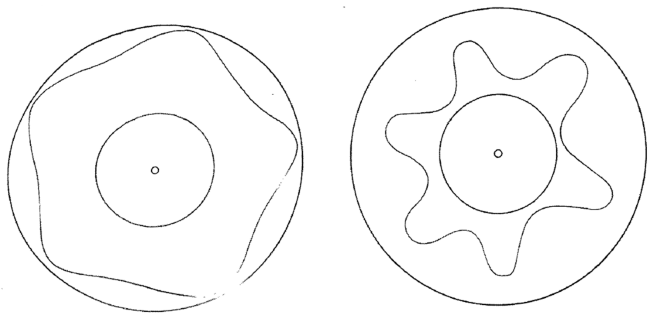

Figure 2: Typical drape diagram for sateen left and acetate right, source: Chu, Cummings and Teixeira, 1950.

Pierce (1930) connected fabric handle to objective fabric properties. At the same time Pierce found a relation between the stiffness and weight of a fabric and its drapeability. By introducing the Flexometer Pierce enabled measurement of the drape of fabric, expressed in bending length. Chu, Cummings and Teixeira (1950) further refined drape measurement, they argued that fabric and paper can have the same 2D measured properties but a complete contrast in appearance. To distinguish between those materials, they developed the Fabric Research Laboratories (FRL) drape meter. To achieve a surround drape they placed a circular fabric specimen on a disc with a smaller diameter, allowing the fabric to hang over the edge under its own weight, thus showing a closer relation with the drape of a skirt or a cape where the fabric folds and buckles around the human body. In order to compare the various drape profiles, the authors introduced the term drape coefficient. Cusick (1962, 1965) further developed three-dimensional drape measurement, following the principle of the FRL drape meter. The Cusick's drape tester, shown in Figure 3, was adopted by BS5058 (British Standards Institution, 1973). The drape coefficient is calculated with the following equation:

$$DC = \frac{M_2}{M_1} X\ 100$$ (BS 5058 British Standards Institution, 1973).

Where M1 is the paper ring and M2 the shadow of the drape, as visualised in Figure 4 (BS5058).

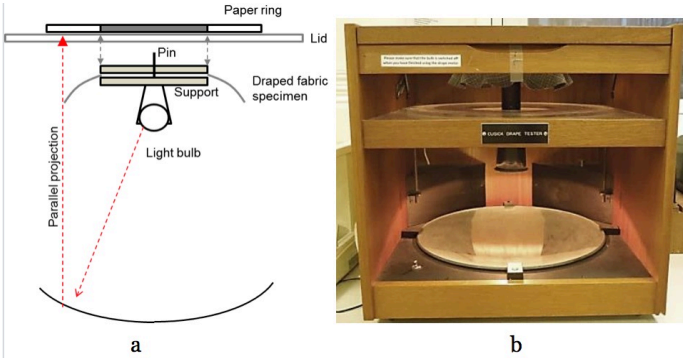

Figure 3: Drape meter principle; (a) schematic diagram adapted by the author from source: BS 5058 British Standards Institution, 1973, (b) photograph of Cusick's drape tester.

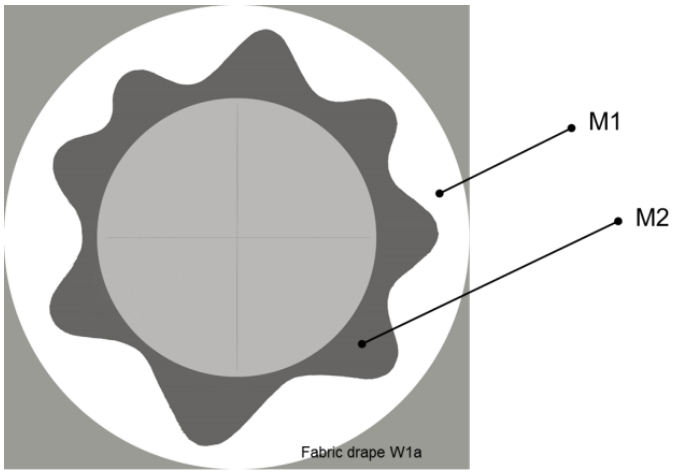

Figure 4: Paper ring and draped shadow; (M1) the white area of the ring with the shadow of the draped specimen (M2) on it. The light grey area in the centre represents the support disc.

The drape coefficient is an objective measurement, expressing the percentage of the deformation occurring in the unsupported hanging part. Rigid material will have more and limp material less resistance to distortion Cusick (1962 pp. 21-40; 1965). Most of the fabrics can be tested with a fabric specimen of 30 cm diameter, however, for limp fabrics with a drape coefficient below 30% a diameter of 24 cm is recommended to prevent them forming nodes under the support, whilst for rigid fabrics with drape coefficients above 85% a fabric specimen with a diameter 36 cm is advised (Cusick 1968).

'Drape induced by gravitational force depends on the structural and mechanical properties of the fabric' (Jeong and Phillips, 1998). After the work of Pierce, important research in methods and instruments to measure fabric properties emerged. A significant step was made when Kawabata (1980) introduced the Kawabata Evaluation System (KES); an overall concept for measuring fabric properties. The KES instruments quantify the essential mechanical parameters of a fabric which are the properties that determine fabric's handle, drape and formability. The low stress behaviour the material undergoes during wearing, garment assembly, finishing processes and weaving, are bending, shearing, tensile and compression. With four instruments, KES measures these parameters (Kawabata, 1980). A few years later the Australian CSIRO Division of Wool Technology developed

Fabric Analysis by Simple Testing, FAST. The instruments are developed to have an accurate, simple and relative cheap system for obtaining objective fabric properties such as bending, tensile, shear and compression. FAST provides information for cutting and garment assembly as well as performance in wearing (De Boos and Tester (1994).

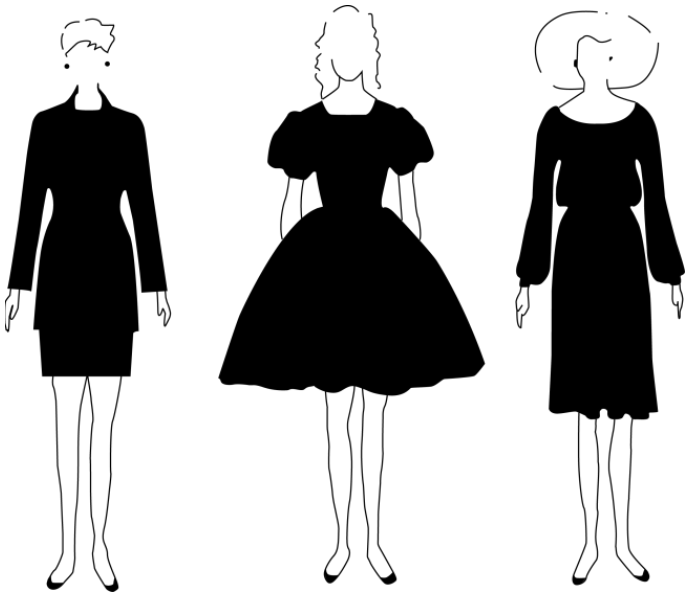

Figure 5: From left to right Tailored, HARI and Drape silhouette, source: Niwa et al., 1998.

Relationships between mechanical properties and drape are found for bending rigidity (Morooka and Niwa, 1976; Collier, 1991; Hu and Chan,1998), bending hysteresis (Hu and Chan, 1998), bending length (Cusick, 1962; Okur and Cihan, 2002), shear rigidity (Cusick, 1962; Collier, 1991; Hu and Chan, 1998; Okur and Cihan, 2002), shear hysteresis (Collier, 1991; Hu and Chan, 1998) weight (Morooka and Niwa, 1976; Hu and Chan, 1998), tensile linearity and surface friction (Hu and Chan, 1998).

Kawabata and Niwa (1998) connected the KES system with the total appearance value (TAV), corresponding to formability, elastic and drape elements. Niwa et al. (1998) related KES data to three drape silhouettes by means of dresses; 'Tailored', 'Hari' (Japanese for spreading or anti-drape stiffness) and 'Drape. For 'Hari (anti-drape)' the fabric is pushed to stand from the body by pleats, gathering and flares, 'Tailored' follows the body and the shape of the garment has an adjusted fit, whilst 'Drape' has a loose fit with the fabric flowing around the body. An expert panel dived 300 fabrics in the defined categories, Table 1 gives an overview, whilst the drape silhouettes are illustrated in Figure 5.

Table 1: Fabrics categorised according the 3 defined drape silhouettes

	Tailored	HARI	Drape
Cotton		XX	
Heavy weight cotton	XX		
Cotton voile			XX
Silk		XX	XX
Polyester	XX	x	x
Wool	XX		
Data adjusted from source: Niwa et al. (1998)			

The drape coefficient is influenced by humidity (Chu, Cummings and Teixeira, 1950), declines over a period of time (Vangheluwe and Kiekens, 1993; Jeong, 1998). Small differences in twist direction (Al-Gaadi, Göktepe, and Haláz, 2012) or cover and weave construction (Jeong and Phillips (1998) influence the fabric drape. Furthermore, the number of nodes are influenced by the draping speed (Jeong, 1998), the proportion between fabric and support disc (Cusick 1962, p.15; Collier 1991; Jeong, 1998) and the shape of the support (Sanad et al 2013). Moreover, two fabrics with a different visual drape shape can have the same drape coefficient, which differs significantly when draping the same fabric multiple times (Jeong 1998). This behaviour depends on the fabric properties and friction between yarn and fibre (Morooka and Niwa, 1976; Niwa and Seto, 1986), as well as the interaction between warp and weft yarns (Jeong and Phillips; 1998). Despite this irregularity, Chu, Cummings and Teixeira (1950) pointed out that fabrics can have a typical drape profile (Figure 2).

Methods and materials

Qualitative and quantitative methods are combined with a greater emphasis on the latter. Subjective and objective data are acquired, the latter by empirical testing and the former through surveys and structured interviews. The relationships between the subjective and objective data are statistically examined. Microsoft Excel® is used for the statistical analysis and to generate graphs and charts, the relationships are investigated with Pearson's correlation coefficient and regression to obtain the significance values.

Kawabata (1980) argued that standardising definitions for fabric hand would reduce confusion. Cusick (1968) divided the drape of fabrics based on their drape coefficients, whilst Niwa et al. (1998) divided fabric drape in three drape silhouettes based on KES measurements. Considering these perspectives, definitions and categories to identify fabric drape might contribute to deeper comprehension specially towards identifying fabrics based on their drapeability in a virtual environment.

The perception of drapeability is investigated through judgement of fabric drape images by expert panels. Following previous studies which have connected objective drape measurements with the human perception of fabric drape through subjective judgment of skirts (Cusick, 1962), or fabric specimens placed on support discs (Collier, 1991). The selection of judges follows the reasoning of Kawabata (1980) who argued that due to their profession the judgment of fabrics by textile experts is representative for consumers. Hence two different types of expert panels are composed for this investigation; a textile panel consisting of 4 textile teachers and 1 textile student, as well as a user panel consisting of 13 teachers and students who are both frequent users of 3D garment simulation software. For the subjective judgement of drape, images of the drape are presented on computer screens. From practical and organisational points of view images of draped objects are preferable to the real draped objects (Cusick, 1962, p. 27). Another important reason to use images is the connection with the digital environment. Additionally, the images safeguard similarity during assessment over a period of time and variety in place.

The principle of the Cusick's drape meter has a central role in this investigation, the proportions between fabric and disc, the drape profile, as well as the views on the fabric are used for the subjective assessment of drape, finally they are correlated with the objective measured drape coefficient. The outcome of subjective assessment of fabrics may vary depending on how the fabrics are presented (Cusick, 1962, p. 40). A drape meter presses the fabric between two discs and at the edge of the support the material drapes under its own weight. A curved shape, however, enables the fabric to buckle free on the support which may lead to a different insight into drape. With regards to this the fabrics are presented on a disc and on a sphere support, as well as from different viewpoints, static and rotating, to enable the judges to obtain thorough insight in the fabric drape.

In individual sessions the textile panel was asked to define the drape of the selected fabrics, in a questionnaire they gave definitions in open-ended boxes and selected definitions from tick-boxes with various expressions used for hand (Bishop, 1996), and clothing movement (Griffiths and Kulke, 2001). During the

evaluation they gave jointly their opinion on the drape categories and identifying key-words derived from their input. These drape categories and identifying key-words are judged by the user panel, who prior to their judgement clustered the fabrics based on their drape. The purpose of the latter was to make the panel familiar with the assessment of the images and to obtain insight in the drape clusters made. Further, for each fabric the expert panels assessed the stiffness and amount of drape on a rating scale. To obtain insight into the perception of drape the relationship between this stiffness and amount of drape is investigate, as well as the relationship with the drape categories and drape clusters and the role of the identifying key-words. Figure 6 illustrates the above described research design, where the red arrows represent the investigated correlation.

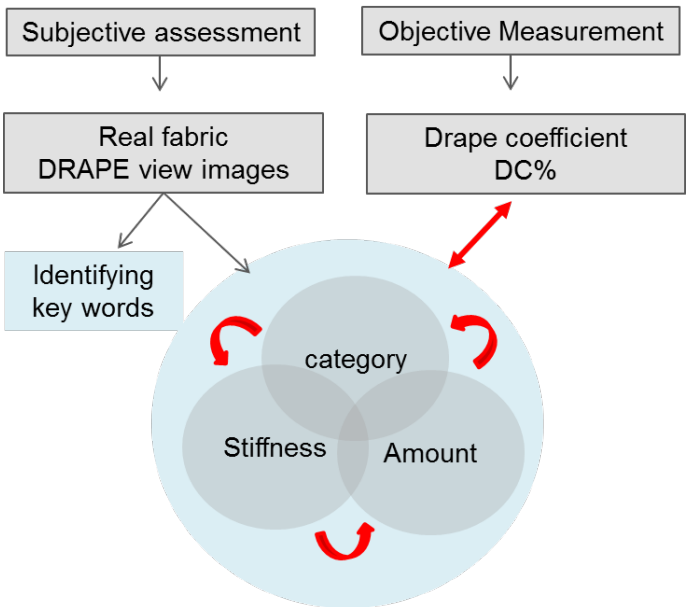

Figure: 6: Research design.

With different behaviour in warp and weft, fabric is a highly anisotropic material, the drape and characteristics are influenced by its composition and the manufacturing process. The typical nature of fabrics is considered during the fabric selection process, aiming to have contrasts and similarity in the fabric range, the selection criteria are listed below.

- Woven.
- Finished state.
- Various weight ranges, from medium heavy to sheer.
- Variety in drape behaviour; fabrics with regular and irregular drape.
- Variation in drape profile; similar and dissimilar.
- Mainly pure compositions; cotton, silk, wool, polyester.
- Weave type.

A preselection based on weight and composition was made from the collection of Print-Unlimited and stock from iNDiViDUALS, who both expressed their commitment by sponsoring the fabrics. These fabrics were tested for drape variation with Cusick's drape meter by draping fabric swatches of 30 cm diameter multiple times. Directly after releasing the outer ring the drape shadow is drawn on the paper ring, this is repeated seven times without replacing the fabric specimen between the drape measurements, for each measurement the shadow is drawn on the same paper ring. By testing various fabric specimen multiple times, seven was found suitable to obtain variation in drape. A woollen twill fabric, W3, showed by seven drape relaxations exactly the same placement of the nodes, whilst for fabrics with a very high variation for each drape relaxation the nodes were placed in a different position. Based on this it was decided to drape the fabrics seven times. Figure 7 gives an example; fabrics FD with high variation, W3 without variation and C6 with some variation in drape profile.

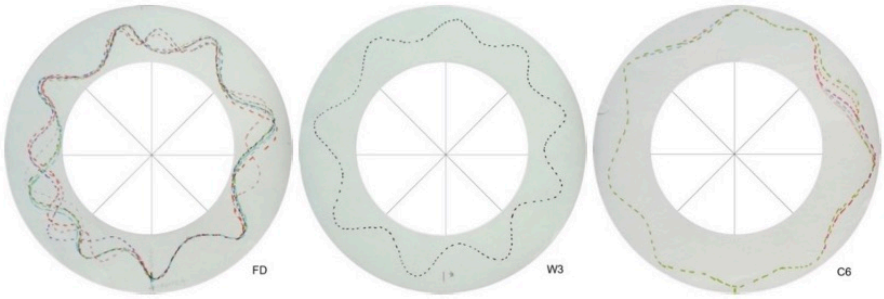

Figure 7: Plots of drape variation tests.

Based on the fabric selection criteria listed above thirteen fabrics were selected from the drape variation plots. Under standard conditions with a relative humidity of 56% +/- 2% and a temperature of 20°C +/- 2°C the drape coefficients are obtained with Cusick's drape tester according to the BS 5058 (British Standards Institution, 1973). Prior to the tests the fabrics are conditioned for 24 hours under the same conditions. All tests are cut with the 30 cm diameter template to compare the various draping fabrics under the same proportion between the supported and unsupported part. The data of the selected fabrics are given in Table 2.

Following the principle of the drape meter two 18 cm diameter support discs are used, which were cut with a laser to achieve accuracy. One is placed on a cylinder with a pin in the centre to centralise the fabric, the other is used as pressure disc on top of the fabric. A plate is used to support the fabric before draping, which is manually lowered to drape the fabric without manual interference. For the other support a polystyrene sphere with a diameter of 12 cm was selected, which was pinned on a receipt spike. To reduce the manual interference of placing the fabric, the sphere support is shaken relative quickly up and down to relax the fabric and allow the fabric to drape more naturally. This method is similar to the 'JIS method' executed by Morooka and Niwa (1976), yet the sphere is shaken only once. For taking rotating images the supports are placed on a turntable, a diagram of the set-up for both the supports is illustrated in Figure 8.

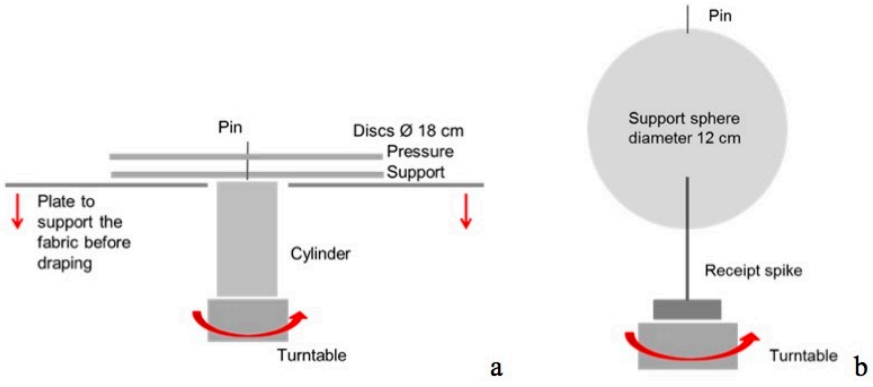

Figure 8: Diagram of the supports: (a) Disc, (b) sphere.

With a camera on a tripod the front views images are taken in a VeriVide Light Cabinet using daylight, D65. In order to obtain similarity between the static and rotating images the videos are made of 16 shots of the rotating drape (Figure 9). The drape profile views are taken on a light box at 80 cm distance from the draped specimen. To judge the drape of the different fabrics in equal relation to each other the images used during the surveys are all set to the proportion of the undraped fabric specimen. This is for the front view images the width of the undraped specimen, and for the drape profile view images the area of the undraped speci-

men. In Adobe Photoshop® the resolution is set to 100 pixels/cm. The images of the draped specimen are copied into the calibration image, representing the undraped specimen with the support disc in the centre. The images used for the survey are illustrated in Figure 10.

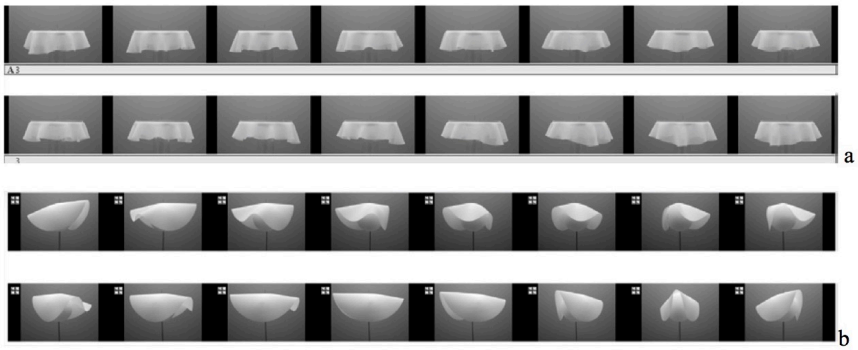

Figure 9: Individual frames stitched for the drape videos: (a) disc, (b) sphere.

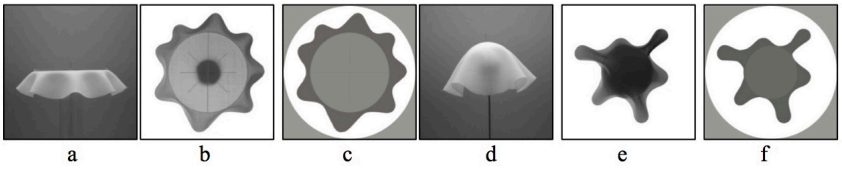

Figure 10: Views: (a) disc front, (b) disc fabric drape profile, (c) disc abstracted drape profile, (d) sphere front, (e) sphere fabric drape profile, (f) sphere abstracted drape profile.

Overviews for each view type showing all the fabrics on the specific view are created, accordingly: disc front; disc abstracted drape profile; sphere front; sphere abstracted drape profile, Figure 11 gives an example for the sphere abstracted drape profile view.

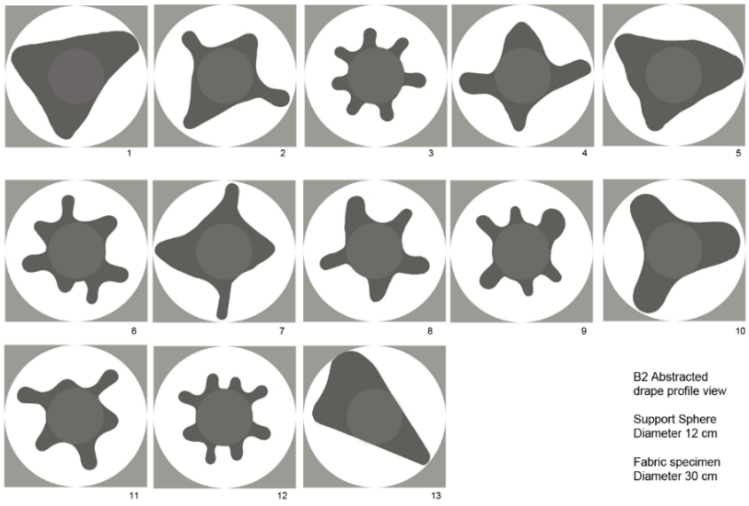

Figure 11: Overview: Sphere abstracted drape profile with all the fabrics.

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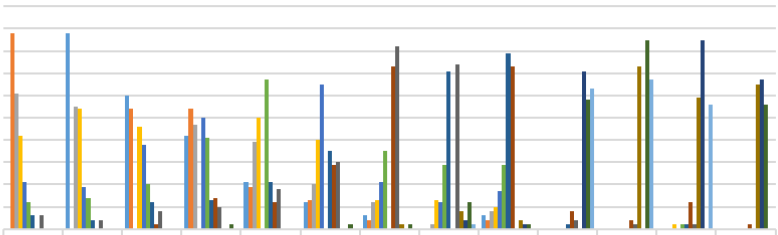
At the start of each session the aim of the survey and what was expected were explained to the judges. To make the panel familiar with assessing the fabric drape, images representing an example of a limp and rigid drape used during the survey were shown. as well as an example of extremely limp and very rigid drape; to provide a contrast for very limp or very rigid material with the material used in this research.

Definitions of fabric drape, categories

During the group evaluation the textile panel simplified and reduced the number of categories, which were derived from their input during the individual rounds. This resulted in three drape categories; *well-draping* for the very limp and fluid draping fabrics, *soft drape* for fabrics combining softness and suppleness with a bit stiffness and finally *body* for fabrics with enough stiffness to create shape. The textile panel assigned a category to each fabric. Furthermore, they indicated similar draping fabrics (Table 3), this selection is used to condense the number of fabrics in the main body of the questionnaire for the user panel.

Figure 12 shows the average of the drape clusters made by the user panel based on the four different overviews as illustrated in Figure 11. Comparison between the drape categories and clusters shows for the fabrics in the category *Well Draping* that the relationships between fabric P1, S3 and S4 is strong, whereas S2 is often combined with fabrics in the category *Soft Drape*. For the fabrics in the category *Soft Drape* the relationship with the drape clusters is strong, also they are often combined with fabrics in adjacent categories. The user panel divided the fabrics in the category *Body* in two drape clusters, between C4 and S1.

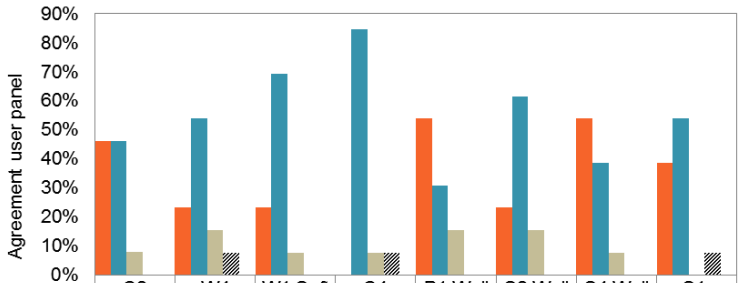


	P1	S3	S4	S2	W2	W1	C5	W4	C4	S1	C2	C3	P2
	Well Draping				Soft Drape		Body						
P1		88%	60%	42%	21%	12%	6%	0	6%	0	0	0	0
S3	88%		54%	54%	19%	13%	4%	0	4%	0	0	0	0
S4	61%	55%		47%	39%	20%	12%	2%	8%	0	0	0	0
S2	42%	54%	46%		50%	40%	13%	13%	10%	0	0	2%	0
W2	21%	19%	38%	50%		65%	21%	12%	17%	0	0	0	0
W1	12%	14%	20%	41%	67%		35%	29%	29%	0	0	2%	0
C5	6%	4%	12%	13%	21%	35%		71%	79%	2%	0	2%	0
W4	0	0	2%	14%	12%	29%	73%		73%	8%	4%	12%	2%
C4	6%	4%	8%	10%	18%	30%	82%	74%		4%	2%	2%	0
S1	0	0	0	0	0	0	2%	8%	4%		73%	59%	65%
C2	0	0	0	0	0	0	0	4%	2%	71%		85%	67%
C3	0	0	0	2%	0	2%	2%	12%	2%	58%	85%		56%
P2	0	0	0	0	0	0	0	2%	0	63%	67%	56%	

Note: Not all fabrics are used by all judges, this results in slight differences between horzontal and vertical values.

Figure 12: Similar draping fabrics combined in drape clusters by the user panel.

After they created the drape clusters the expert user panel judged the appropriateness of the drape categories defined by the textile panel, by assessing the images illustrated in Figure 10, and the videos. Figure 13 shows the agreement of the user panel with the defined categories. Their agreement with the categories defined by the textile panel is high for all tested fabrics. The sum of the sum of "highly agree" and "agree" responses is above 85% for all fabrics, except for fabric W4, which is slightly below 78%. Moreover, the data of the fabrics, the images of the drape and how they are divided in the drape categories are presented in Table 2.



Code and category >	C2 Body	W4 Body	W1 Soft Drape	C4 Body	P1 Well Draping	S2 Well Draping	S4 Well Draping	S1 Body
Strongly Agree	46%	23%	23%	0%	54%	23%	54%	38%
Agree	46%	54%	69%	84.62%	31%	62%	38%	54%
Neutral	8%	15%	8%	7.69%	15%	15%	8%	0%
Disagree	0%	8%	0%	7.69%	0%	0%	0%	8%
Strongly Disagree	0%	0%	0%	0%	0%	0%	0%	0%

Figure 13: Details of agreement of user panel with drape categories defined by textile panel.

Table 2: Data fabrics in combination with drape categories and drape view images

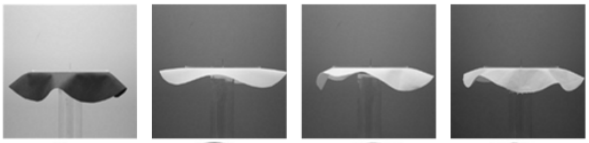
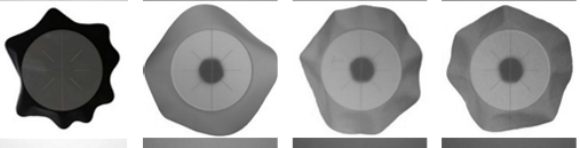
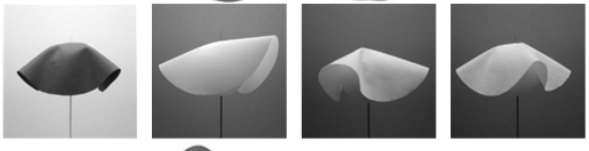
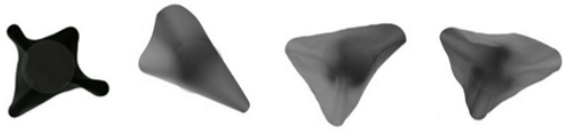
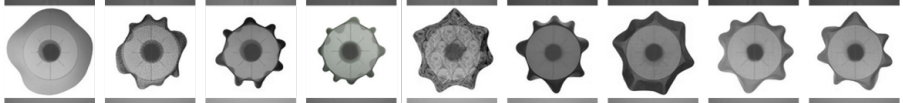
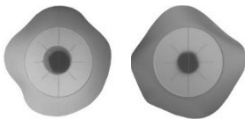
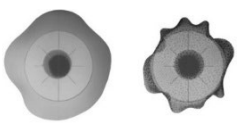
W4	P2	C2	C3	Code
Medium Heavy				Weight group
254	252	272	279	Weight g/m²
100% WO	100% PES	97% CO 3% EL	100% CO	Composition
Twill	Plain	Twill	Plain	Weave
14/18	3217	30/20	16/23	yarn/cm 1/2
60%	91%	88%	91%	DC%
Body	Body	Body	Body	Category
				Disc Front view
				Disc abstracted drape profile view
				Sphere Front view
				Sphere abstracted drape profile view

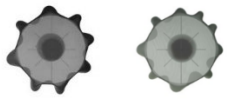
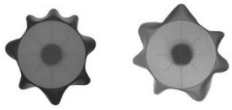
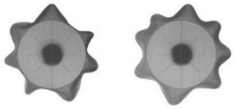
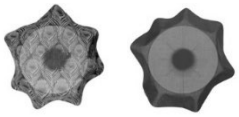
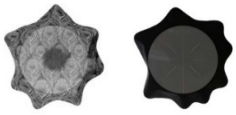
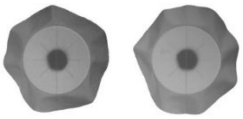
Table 2: Data fabrics in combination with drape categories and drape view images

Code	S1	S4	S3	P1	C5	S2	C4	W1	W2
Weight group	Light // Sheer				Medium Light				
Weight g/m²	25	27	54	69	81	88	90	115	161
Composition	100% SE	100% SE	92% SE 8% EL	100% Pes	100% CO	100% SE	100% CO	100% WO	100% WO
Weave	Plain	Plain	Crepe	Plain	Plain	Satin	Plain	Crepe	Plain
yarn/cm 1/2	34/37	52/40	55/43	44/32	46/46	52/55	35/43	25/21	24/19
DC%	80%	28%	23%	20%	56%	31%	74%	44%	36%
Category	Body	Well Draping	Well Draping	Well Draping	Body	Well Draping	Body	Soft Drape	Soft Drape
Disc Front view									
Disc abstracted drape profile view									
Sphere Front view									
Sphere abstracted drape profile view									

Contrasting fabrics such as P2, a heavy polyester plain weave, and S1, a sheer organza with the lightest weight in the range, can have similarity in drape profile and variation. However, similar fabrics in weight, composition and weave can have opposite drape profiles and variation as illustrated by fabrics S1 and S4. The similarity and contrasts between pairs of the selected fabrics according the criteria are illustrated in Table 3. Moreover, they are set against the disc abstracted drape profile of both fabrics. Additionally, the column 'User panel drape combined' shows how the drape clusters made by the user panel relates to the indicated drape similarity by the textile panel marked with*. The percentage show the mean of the combinations made based on the four overviews (Figure 11).

Table 3: Similarity and contrast

Fabric	User panel drape combined	Disc abstracted drape profile	Drape profile	Drape variation	Weight	Composition	Weave
S1/P2							
S1/S4							

Fabric	User panel drape combined	Disc abstracted drape profile	Drape profile	Drape variation	Weight	Com-position	Weave
S3/P1*	88%						
S2/W2							
W2/W1*	65%						
C5/C4*	79%						
C5/W4							
C3/C2*	85%						

	Similar		Contrast		Indifferent
* Drape similarity indicated by textile panel					

The correlation between drape coefficient and judgment of the stiffness of the drape is significant and positive with r = 0.959, $p<0.0002$. The correlation between drape coefficient and amount of drape judged by the expert panels is negative and slightly higher with -0.970, $p<0.0001$. This is illustrated in the scatter graphs in Figure 14. Moreover, the correlation between amount of drape and stiffness of drape is inverse related, as expressed in the statistically significant correlation with r is -0,99 and $p<0.0001$, which confirms with the findings of Collier (1991).

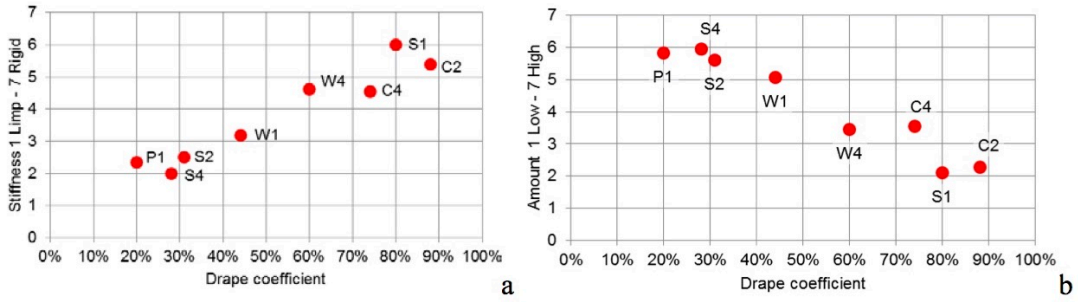


Figure 14: Correlation between subjective assessment of drape and drape coefficient; (a) stiffness of drape, (b) amount of drape.

The high correlation between drape coefficient and the subjective judgement of the stiffness of drape demonstrates the panels ability to identify the fabric drape based on the images.

Cusick (1962, 1968) divided the drape of fabric based on drape coefficient, the author distinguished between very limp fabrics with a drape coefficient below 30% and very stiff material with drape coefficients higher than 85%. The category *well draping* fits with the first, for category *soft drape* and *body* this relationship is not found. As illustrated in Figure 12 the drape clusters are in the category *body* divided into two groups; one cluster with drape coefficients of 56%, 60% and 74%, and the other with drape coefficients above 80%. The latter, fabric S1, has a mean drape coefficient of 80%, however only its face up drape coefficients is between 87% and 89%, based on this the border may be defined between 74% and 87%, which is close to the border defined by Cusick (1968).

Definitions of fabric drape, identifying key-words

The categories discussed in the previous section divided the fabrics roughly based on their drape, nevertheless, they lack information to express the specific nature of the fabrics. Contrasting fabrics are combined in the same category as well as in the same drape cluster. This section presents the suitability of identifying key-words to distinguish more accurately between different fabrics. Fabric W4 differs significantly from C4, however, based on their drape they are classified in category *body*. The same contrast applies to S1 and C2. For fabric S1 one of the textile judges commented on the drape: *'in spite of the stiffness the material was interacting with the shape of the support*'. During the group evaluation the textile panel agreed jointly with *adjusted rigid* as it covers the stiffness as well as the interaction with the support. Moreover, for polyester fabric P1 classified in the category *well draping* the word clouds in Figure 15 show the diversity of the definitions. Part of them are more or less indicated by the cat-

Figure 15: Definitions by the textile panel for fabric W4, C4, C2, S1 and P1.

egory, such as; *floating, fluid, flowing, moveable, quite-wavy, soft flowy* and *drape*. In contrast to *well-draping* is the frequent use of *stiff* to define the drape with; *stiff-edges, stiff-suppleness, certain-stiffness* and *stiff*. Figure 15 presents on the left side the definitions from the open-ended boxes and on the right side those from the tick boxes.

The derived key-words were reviewed by the textile panel during the evaluation session. The final agreement of the textile panel was judged by the user panel during the main body of the survey. Figure 16 shows the agreement, representing the sum of "highly agree" and "agree" responses, of the user panel with the defined identifying key-words for the particular fabrics.

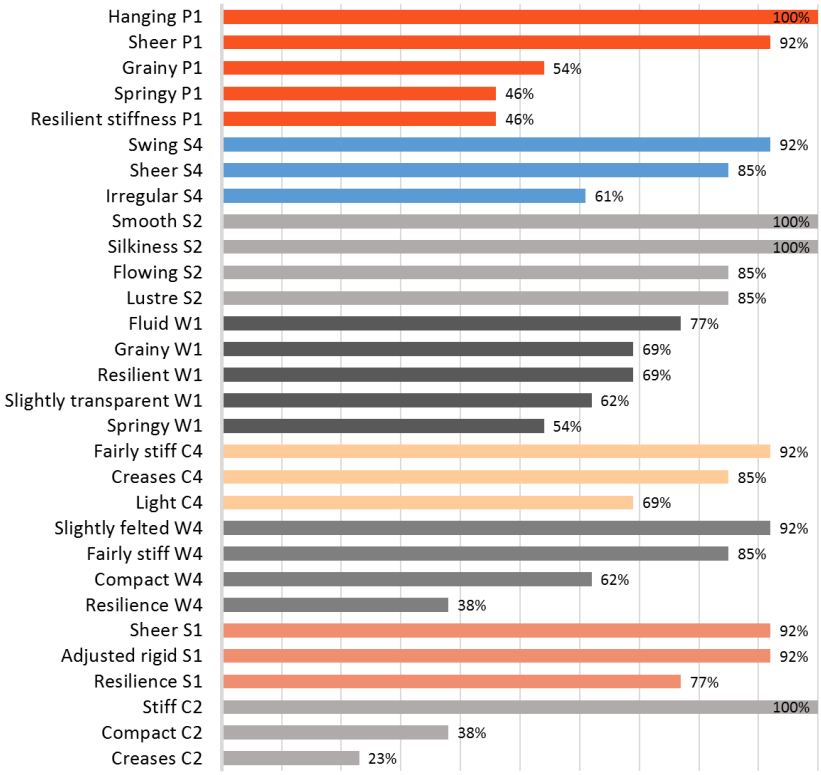


Figure 16: Agreement of the user panel with the identifying key-words.

Conclusions and future work

This research studied how to increase insight into the perception of fabric drape in a digital or virtual environment, executed with a range of woven fabrics with weights varying from sheer to medium heavy, selected on their drape profile and drape variation.

A relationship between the objective measured drape coefficient and the perception of the stiffness and amount of drape is demonstrated with statistically significant correlations; positive for stiffness of drape with r = 0.959, $p<0.0002$ and negative for amount of drape with -0.970, $p<0.0001$. The judged stiffness of drape is inversely related to the amount of drape, which confirms with earlier research.

Fabrics can be divided into categories based on the way they drape. The first category is *well draping,* for fabrics with limp and fluid drape. The second category is *soft drape* for fabrics with soft and supple drape. The third category is *body* for fabrics with a stiff drape and having enough body to give shape. Those categories are related to the drape coefficient and the rated stiffness and amount of drape, for the later the relationship is inverse. Fabrics with category *well draping* are judged limp and have drape coefficients below 30%, with category *body* are judged stiff and have drape coefficients above 56%, with category *soft drape* are judged in-

between limp and stiff and have drape coefficients between 44% and 56%. By ordering the fabrics in the drape clusters, the user panel created four drape groups by splitting the category *body* in two, with a sharp border between 74% and 87%, which is close to the border defined by Cusick (1962; 1968). Nevertheless, their agreement for the fabrics in the category *body* was high. The drape category *well draping* aligns with the division Cusick made to measure the drape coefficient for limp fabrics with drape coefficients below 30%.

The tentative investigation showed that identifying key-words can distinguish between contrasting fabrics with a similar drape, such as a felted wool and a crisp cotton, or a weighty cotton and a sheer organza.

The skills required for assessing and selecting fabrics in a virtual environment are disruptive to traditional processes and new rules apply. This research to define fabric drape enables more insight in the perception of fabric drape, identifying key-words and drape categories might contribute to the perception of virtual fabric drape.

Due to limited availability, different schedules and working days, for the group session with the textile expert judges to evaluate the defined drape categories, were used with 3 of the 5 judges.

Future research with international expert panels could contribute to establish an internationally recognised drape vocabulary consisting of fabric drape categories and fabric identifying key-words. Moreover, to investigate the contrasts between the created drape groups and the ordering of the fabrics in the categories. Further refine this first endeavour to assign identifying key-words, preferably with a larger range of fabrics. Additionally, subjective judgment by expert panels to define the exact borders between the categories with a larger range of fabrics with drape coefficients between the borders of the categories.

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Protective Clothing - an Evolution of Aesthetic and Comfortable Safety Wear

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Safety professionals, personal protective clothing, smart textiles, fashion, safety and comfort

ABSTRACT

The unmatched blend of technology and innovations has always created history. What if, it is mixed with aesthetics? Protective clothing (PC) is known for its blend of technology and innovations. It is part of technical textiles that are defined as comprising all those textiles – based products, used principally for their performance or functional characteristics rather than their aesthetic characteristics. The purpose of PC is to shield or isolate individuals from chemical, physical and biological hazards that may be encountered during occupational operations. This paper aims at breaking this rule while concentrating on protective clothing for process-based industries. The authors plan to start a discussion - safety needs to break the state of boring and embrace aesthetics. Given mankind's child like obsession with the future, we're remarkably rigid when it comes to the approach towards clothing. It is only now that fashion industry is warming up not only to the idea of game changing new technology, but its real life potential to advance what we wear, how it's designed, manufactured and marketed to the world. Granted that fashion would be famous for Avant Gardè or Couture comprising of bubble-spewing dresses and mood responsive clothing. But beyond those fanciful borders there's a new wave of innovators more concerned with impacting fashion on everyday level, far away from sensationalist headlines of tabloid press. When it comes to PC market, it first saw developments in finish of fabrics, which then evolved into providing various finishes along with comfort. This further need to evolve into blending smart textiles, comfort and style statement. Eventually industrial workers wearing these have no other choice but to wear these boring clothing under the pretext of safety compliance. The researchers through this paper will provide new design solutions for industrial workers, which blend their safety with fashion. The target market includes select Original Equipment Manufacturers, chemical manufacturing and process industries' workers. Main reason for noncompliance, according to a third of workers was feeling of invulnerability. Research methodology will include a detailed survey across these industries, assessment of clothing needs, review of literature, design development followed by evaluation of acceptability & effectiveness of this fashion forward protective clothing. The findings are significant for improving occupational safety, health as well as style statement. This paper attempts to coalesce the idea of exuberant research that has gone into field of protective clothing right from material selection to modeling with emphasis on creating a fashion statement with safety. When smart textiles come with aesthetics, why can't smart and technical protective clothing meet the aesthetics? The masses have embraced fashion in school uniforms, formal wear, sportswear, etc. The need is for style to be created in such a manner to be liked by each and every head of the plants, which they are proud of, comfortable to carry, creates no disparity amongst the workers and yet can keep them safe. The key is to balance function (protection) and form (style, comfort and wearability) within the scope of a realistic hazard assessment and risk analysis.

Introduction

Origin of clothing started with the need of protection and modesty but slowly shifted focus to aesthetics over its vast history. Then again there came a need to have protection as the functionality-giving rise to protective clothing segment. Protective clothing (PC) is part of Personal Protective Equipment (PPE), which is designed with a sole intention of protecting the wearer from injury or infection. Protective clothing includes all clothing and equipment worn over or in place of normal work clothing for the purpose of protecting the workers from harmful chemicals, heat exposure, toxic gases etc. Protective clothing may not do much to reduce the harmful effect of chemicals but it surely sets up barrier against chemicals thus enhancing the safety of the people working under hazardous conditions, while selecting or designing protective clothing many factors have been found to influence its effectiveness. Each potential hazard has different problem areas and requires specific solutions in form of PC. This research paper concentrates on the PC segment for Process based industries.

Process Industries are the industries with procedures involving chemical, physical, electrical or mechanical steps to aid in the manufacturing of an item or items, usually carried out on a very large scale. It is common in the food, beverage, chemical, pharmaceutical, consumer packaged goods, and biotechnology industries. Process manufacturing is the branch of manufacturing that is associated with formulas and manufacturing recipes (www.iienet2.org , December 2008).

Chemicals can enter the body through mouth, respiratory tract or skin. A worker can inhale the gases, fumes, mist, dust and vaporized solvents while mixing and preparing chemical. Though a worker can absorb chemicals through ingestion, chemical contamination through skin is the most common cause of poisoning during mixing, loading, application and maintenance of equipment (Fraser and Keeble, 1988). Hence, while manufacturing or applying chemicals the use of PC is recommended to prevent dermal exposure. In many jobs individual are required to use protective clothing to prevent adverse exposure to physical, chemical and environmental stress factors.

During the last decade the interest in research on protective clothing and their effects has grown (Mani & Sivakkumar, June 2011).

According to PR Newswire (New York) January, 2014 the Protective Clothing Market is expected to grow at a CAGR of 6.0% over the next five years to reach $8 billion by 2018. Asia- Pacific, with its flourishing economy and rapidly expanding industrial sectors, is an emerging market and will experience the second-highest growth in demand during 2013 to 2018, after North America.

This global market is analyzed in terms of revenue ($million) application-wise, on the basis of fabric type, end-user industry-wise, and user type-wise for all major regions, namely, North America, Europe, Asia-Pacific, Middle East & Africa, and Latin America. Major countries in respective regions further break down the revenue figures. Aramid & blends, polyolefin & blends, polyamide polyethylene, cotton fibers, laminated polyesters, and others (various rubber types, leather) are the major materials used for the production of protective clothing. The major users of this clothing are by the consumers for personal use and industrial users in risky and hazardous working conditions (http://www.researchandmarkets.com/research/protective).

There is a distinct lack of safety culture in the country, inspite of so many chemical Industries the concept of protective clothing is still at an infancy stage. The solution to this problem lies in educating the workers about safe handling of chemicals. In majority of the units/industries workers are wearing work clothes but that hardly provides any protection against harmful chemicals or the Protective suit available is uncomfortable. Workers are provided with accessories like goggles, gum boots, masks helmets and gloves, which hardly they are using because of discomfort in wearing them in hot and humid climate (Mona Suri, 2002)

Designing Protective Clothing

Clothing contributes to how people define and perceive themselves and is a necessary part of their everyday lives. Clothing promotes a feeling of wellbeing and has the potential for a multidisciplinary functional approach. To be acceptable and comfortable, products must look stylish and attractive and function reliably in relation to technical and aesthetic concerns of the wearer. Good aesthetic and technical design, driven by meaningful end-user research, can help exploit niche markets where form and function work in harmony in the research and development of comfortable and attractive products that can assist us in many aspects of our daily lives. (McCann)

The primary function of protective clothing is to act as a physical barrier between the skin and chemical. If garments are to serve as effective barriers against chemicals penetration, they should cover all those areas that are most exposed to chemicals and be made of fabric that can prevent the penetration. Various parameters of a fabric contribute towards penetration performance. Fiber content affects the chemical penetration. Cotton has been found to provide greater protection than polyester-cotton or 100% polyester (Leonas, 1991). Though pure cotton and polyester-cotton blends offer more protection, none of them, provides complete protection. Spun bonded olefin fabrics (Tyvek®) and Polytetra fluoroethylene laminates (Gortex®) have been specially made to provide dermal protection from harmful chemicals but their cost and availability are the limiting factors (Ranson and Sweeney, 1991). Non-woven fabrics in general appear to perform better than most woven or knitted fabrics; however, close weave fabrics like heavy weight twill fabrics also perform considerably well (Dejonge and Easter).

Besides the construction of fabric, the surface properties can be altered by treating it with a topical covering in the form of renewable or durable finish. Taking into consideration the fact that many chemicals handlers insist on wearing and reusing conventional work clothes, it was found (Obendorf et al, 1991) that starch could act as a chemical trap, preventing transfer of some chemicals and also aids in its removal during laundry. Many semi-durable and durable finishes based on silicones and fluorocarbons are also now available. Initially hydrocarbons such as paraffin waxes were used. These finishes produce good water repellency, can withstand water pressure and are available at reasonable cost. They do, however, have the disadvantage of filling the pores of textiles thereby reducing the comfort and breathability. Also, they do not impart any oil repellency and are not wash-fast. An improvement in wash-fast water-repellent finishes was subsequently achieved by the use of silicones. They are water vapour permeable; offer a soft handle resulting in greater wearer comfort. But they have the disadvantage of not being oil repellent; rather they encourage soiling (Knaup, 1999).According to the paper by J.Gerask & M.Marcic on the Complex Design Concept for Functional Protective Clothing, Designing protective clothing as an integral part of personal protective equipment (PPE) is an extremely complex task. Protective clothing must be so designed and manufactured by foreseeing those conditions of use for which it is intended so that the user can perform the risk-related activities normally whilst still enjoying, at the same time, appropriate protection at the highest possible level. Protective clothing should be designed and manufactured so as to facilitate correct positioning for the user whilst remaining in place for the foreseeable period of use, bearing in mind ambient factors, the movements to be made, and the postures to be adopted. Modern technical developments are, in this way, used in enhancing the functionalities of protective clothing systems - by providing intelligent functions to this type of clothing. Functional protective clothing provides a special functionality for the wearer, such as assistance when monitoring and evaluating those potential

hazards encountered by the user, such that conventional protective clothing could not. Functional protective clothing with intelligent characteristics is also considered to be an object of interdisciplinary research, covering different disciplines.

The multi-disciplinary nature of functional protective clothing with intelligent characteristics necessitates the integration of protection research, material science, clothing engineering, comfort, functionality, whilst

including the objectives of the environment and communication, as *illustrated* in **Plate I** the multidisciplinary approach to functional Protective Clothing.

Protective clothing should be practical, functional and comfortable. It should also be acceptable to the individuals who will wear it (Henry, 1980; Fraser and Keeble, 1988). Protective clothing should be similar in design or style to the regularly worn work clothing. Thus problems associated with chemical penetration, garment comfort, aesthetic styling and sizing should be solved at this stage. The key requirement of design development for PC involves functionality and comfort as the only focus. But at the same time the authors based on interviewing workers in chemical process based industries propose that for PC to be acceptable it needs to have a multidisciplinary approach to strike a balance between providing safety and protection, functionality, human comfort and psychosocial aspect. Along with these factors PC should be economical so that most of the small-scale industries can afford them.

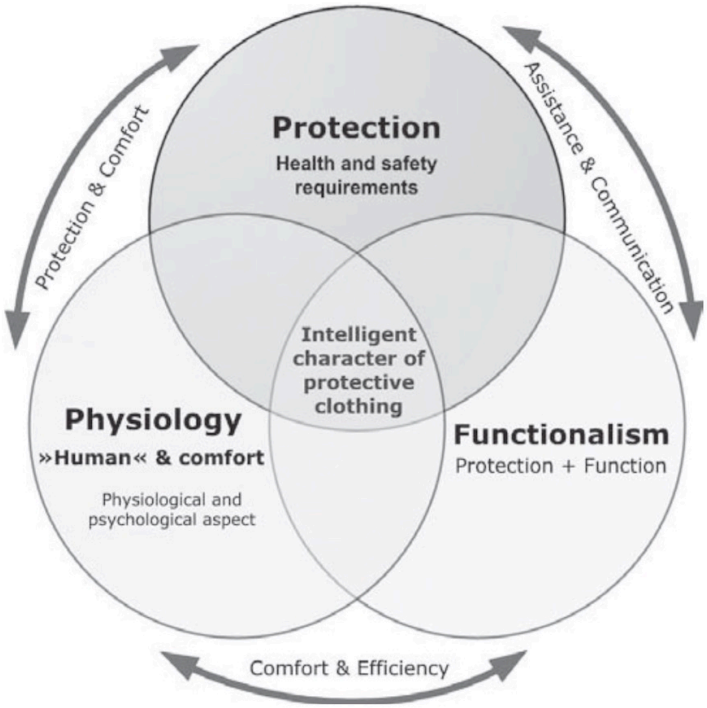


PLATE I *Multidisciplinary approach to functional protective clothing (Source: J. GERŠAK, M. MARČIČ: The complex design concept for functional protective clothing, Tekstil 62 (1-2) 38-44 (2013.)*

Design concept for functional protective clothing, where design criteria for functional protective clothing must be unequivocal specified; for example protection from chemicals is achieved by blocking their penetration and permeation through the fabrics of the clothing. This is an effective method for providing sufficient protection; however, total blockage of the penetration and permeation also affects the transport of any heat and moisture generated by the wearer of the protective clothing, and results in possible heat stress. It witnesses the complexity of designing protective clothing and asks for even higher requirements when designing this type of protective clothing, both from the point of view of protection and comfort, and from that of functionality. Thus, the current status of PC shows clearly a need for developing PC that is functional, comfortable and also has aesthetics. The same was reflected in the interviews with the workers, which will be discussed later in the paper.

Objective of the study

1. To identify the Process Industries in Petrochemical, Agrochemical, Fluorochemical and various other Industrial organic and inorganic chemicals industries; and to assess the clothing needs of the workers in these Industries
2. To design Protective Clothing using the available smart textiles that are suitable for the right hazards
3. To design PC which breaks the usual practice of being only functional and instead strikes a balance between functionality, comfort and aesthetics of PC ensuring utmost safety.

Methodology

The sampling frame is based on the Interviews conducted with 15 industries in the Western and Northern region of India. For this study, 250 workers and 50 safety professional, Engineers, scientist have been selected randomly from 15 different process based Industries and OEMs (Original Equipment manufacturers).

The aim of the study is to design Protective Clothing with the available protective textiles in the market for various Original Equipment Manufacturers (OEM's) and chemical manufacturing and Process industries by adding on style statement to the PC. A study was conducted in a phased manner in 3 parts

Phase I

- Identifying 15 Process Industries through snowball sampling, personal Contacts and Internet.
- Assessment of clothing needs of workers in process industries (250 workers).
- Referring various libraries for literature survey collected secondary data.
- Sample Selection: The total sample size comprised of 15 industries. (Pan India).

Tools and Techniques of data collection - Interview Schedule was designed for proprietors of Process Industries & Industry safety professionals (30 in no.), their supervisors & Engineers (20 in no.) and workers (200 in no.). The questionnaire used for survey is attached as Annexure 1.

Permissions and consents were taken from the industries to ensure no disturbance occurs while the research was ON. The respect of the research respondents' confidentiality and anonymity was maintained.

An Interview was conducted with the workers and safety professionals to understand how the workers actually do their job, how they use their personal protective equipment and how they can be exposed to multiple hazards in completing their everyday task. As a result a direct correlation between the hazard and the protective material has been proposed and this is viewed as the full selection. The need to conduct a survey for the where about of whether the worker knows how to wear the PC was known or not was conducted.

Phase II - Identification of the right Protective Textiles for the Process Industries identified and the suitable PC based on the protection requirement.

The authors propose selection of smart textiles based on the hazard they are prone for.

Table 1. Chemical and petrochemical Protective Clothing design types by body area

Body Area	Type
Entire Body	Totally encapsulated suit
Torso, head, arms, and legs(excluding hand, feet, and face)	Hooded Coveralls
Torso, arms and legs	Coveralls
Top torso and arms	Coat or Jacket Lab coat
Bottom torso and legs	Pants
Torso(front) and arms	Sleeved apron
Torso (front)	Hood with visor
Head and face	Hood
Head	Booties
Foot	Boot or Shoe cover

Textile Industry contributes majorly to increase the safety of workers on field, through innovation and alliances. Once the need for Protective Clothing is decided the safety professional sees to it that the frontline worker uses and maintains it correctly. Proper selection, training and use of PC are essential. An Interview was conducted with the workers and safety professionals to understand how the workers actually do their job, how they use their personal protective equipment and how they can be exposed to multiple hazards in completing their everyday task. As a result a direct correlation between the hazard and the protective material has been proposed and this is viewed as the full selection.

Factors of Selection or requisite characteristics of PC:

- It should give adequate protection against the nature, severity and type of hazard.
- It should be of minimum weight, should give minimum discomfort with protective efficiency.
- Attachment to the body should be flexible yet effective.
- The wearer should not be restricted in movement or perceptions required for the job.
- It should be durable and aesthetically appealing.
- It should not cause any hazard through its material, design, defect, use or failure
- It should conform Indian Standards and tests required.
- It should be easy to clean, repair and maintain.

An effort needs to be made to achieve the maximum of the above.

Various chemical resistant materials are available in the market such as Teflon(a fluorinated - ethylene propylene material for face shields. Viton- Fluorinated material developed by Du pont co. for protective gloves. There is a variety of Personal Protective clothing available for specific work situations. however, selection of the most appropriate form of protection is very complex, as safety mobility and dexterity, comfort and cost must be balanced.

Table 2.Selection of material for the construction of Protective Clothing as per the nature of hazard

Material	Kind of Hazard	Application	End Use Industry
Metal	Flying Particles, Falling Body, Sharp Edge, abrasion	Mechanical	Original Equipment manufacture's (OEM's), Control Valve Manufacturers, Fabricators, Steel Industry
Fibre metal	Sparks, falling body, flying particles, sharp edge, abrasion machinery	Mechanical	Original Equipment manufacture's (OEM's), Control Valve Manufacturers, Fabricators.
Metal screen	Sharp edge & abrasion	Mechanical	Original Equipment manufacture's (OEM's), Control Valve Manufacturers, Fabricators.
Plastic, PVC	Hot liquid, moisture, water, petroleum product, acid, alkali, spark, falling body, flying particle, electric shock, skin protection	Thermal Chemical	Petrochemical Industry, Chemical and Agrochemical Industry, Paper Industry

Material	Kind of Hazard	Application	End Use Industry
Rubber	Hot liquid, moisture, water, acid, alkali, electric shock, machinery, skin		Petrochemical Industry, Chemical and Agrochemical Industry, Pharmaceutical
	protection		Industry, Food Industry, Paper Industry
Conductive rubber	Explosive substance		Petrochemical Industry, Refineries, Oil and Gas Industry
Chrome leather	hot substance, flying particles, sharp edge, abrasion, sparks	Mechanical	Boiler Manufacturers, Fabricators, Vessels manufacturers, Reactors Manufacturers
Canvas	Flying particles, sharp edge, abrasion, machinery		OEM's
Asbestos	Heat, hot substance, sparks	Thermal	Textile Industry, Chemical Industry, Welding
Tyvek	Hot substance	Petrochemical & Chemical industrial cleaning and maintenance, and land clean-up	Petrochemical & Chemical Industry
Acid proof Fabric (Tychem, Microchem)	Acid and alkali	chemical oil handling, land decontamination, production plant decommissioning, industrial cleaning and maintenance, tank and oil tanker cleaning, spill clean- up and accident intervention, the gas supply sector, typical chemical industry applications	oil and gas industry , petrochemical Industry
Reflective fabric	Hot liquid	Visibility	Typical Chemical Industry, Petrochemical Industry
Flame resistant fibres(Para – and meta – aramids, Polybenzimidazol e(PBI) Flame retardant finished fabrics – Proban, Pyrovatex, Nomex, Kevlar, Ultra Basofil (melamine fiber)	Heat, hot substance, sparks, chemicals, flying particles, machinery	Thermal Chemical UV resistance	Oil and Gas Industry, Hazardous Chemicals Industry, Petrochemicals, Refineries, Fertilizers

Material	Kind of Hazard	Application	End Use Industry
Millenia XT Conex Airlock	Heat, steam, Hot substance sparks	Thermal	Chemical, Petrochemical, fertilizer, steel Industry
Cotton wool	Heat, sparks, machinery , skin protection	Mechanical Thermal	OEM's, Chemical Industry, Petrochemical Industry, Foundaries
Woollen fabric, worsted fabric	Hazardous liquids (Sulphuric acid, hydrochloric acid, nitric acid), acid resistant	Chemical	Chemical Industry, Petrochemical Industry
Cotton canvas	sharp edge, abrasion	Mechanical	OEM's, Fabricators
steel toe boot	Falling body, striking	Mechanical	All Industries
Specially made asbestos clothing	To work with hot metal upto 1650 degree C	Thermal	Steel Industry
Aluminised asbestos or glass fibre and wool lining	To work near a furnace at temperature upto 540 degree C or for fire fighting. Such proximity clothing should not be utilised to enter into the fire. They are for working from a distance.		Thermal Power Plants,
Flameproof or fire resistant cloths - Nomex or Modaphrilic fabrics	Fireproof cloths to work in the fire flames.	Heat	Steel Industry, Foundaries, Petrochemical, Hydrocarbon Industries
Thermal net cotton, quilted material (decron, nylon)	To work in cold weather(not suitable for hot weather)	Thermal	Formulation Plants, Food Industry, Pharmaceutical Industry
Leaded Clothing (leadglass fibre, leaded rubber, leaded plastic) (Toray Co. of Japan)	Laboratory work, protection against X and Gamma rays	Biological/Radiation	Chemical Industry
Goretex, Tetratex, Porelle, Proline, Vapro, sympatex,Action, Neo Guard	Waterproof permeable, moisture barrier		Water Treatment plants, Effluent treatment Plants, distillery and Brewery Plants
Polyphylene Sulphide fibers(PPS) Polyether ketone fibers (PEEK)		Heat and chemical	Chemical Industry,
Novoloid	High flame resistance, acid resistant, solvent, steam, chemical /fuels		Petrochemical Industry, Fertilizer Industry

Phase III - Developing a Design framework for conceptualization of Protective Clothing.

The authors based on their research went across to modify J. Kersak and M. Marcic's design framework to understand designing PC and it's acceptability permissions and consents will be taken from the industries to ensure no disturbance and harm occurred during the procedures for evaluations and voluntary participation of the participants.

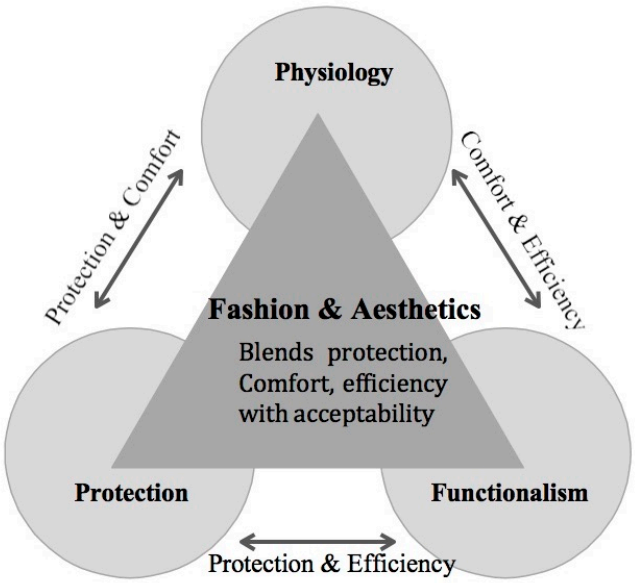


Plate II. Suggested Design Framework for Functional Protective Clothing

Results and Discussion

Design of Protective Clothing for process Industry is a vast scope of work and a complicated task that depends on a number of theories of heat losses, thermal insulation, chemical exposure, fabrication etc. The new design area of smart textiles and wearable PPE demands merging of methodologies across disparate disciplines to inform the application of wearable technologies in smart clothes that have the potential to enhance the quality of life of the target wearer.

The functional design process attempts to externalize the creative thinking of traditional fashion designers by strategizing the design process. A major advantage of bringing design thinking into the open is that other people, such as users can see what is going on, contribute information, & provide insight to solutions that may be outside the designer's knowledge and experience. The end product of the functional design approach is not only met to specially clothing needs of the users such as providing a barrier to toxic chemicals but also to look at the users environment including the near as well as the external environment. For example the heat stress on the user and the climatic conditions under which the user will be working. This approach attempts to accommodate these environments. The solution to the design problem incorporates the knowledge of fashion and human needs into functional designing. Overall, functional PC is designed to meet the physical, social, psychological, and aesthetic needs of the potential users.

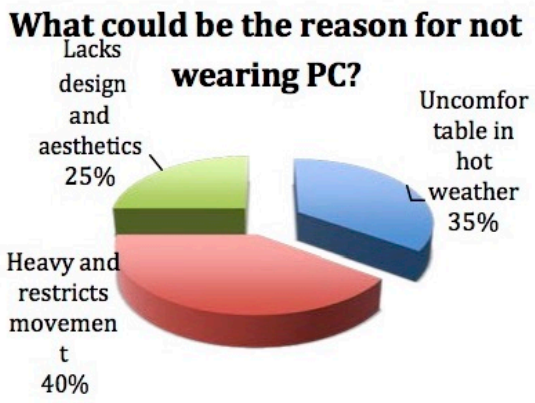
Aesthetic design is for appearance only. In the functional design process, it is critical that the aesthetic design not affect the fit or performance of the garment. It must agree with both the functional and structural designs. This means that functional design or each aspect of a design such as a zipper may also be decorative, but if the design deals exclusively with human protection and safety, the function of a zipper must be eased of donning and doffing the garment with appropriate sealed seams or cover flaps. On the other hand, if the aesthetic needs of the end user have not been met, the garment will not satisfy the needs of the end user. A different perspective is been provided towards the design approach. Primary qualitative research methods were employed, in semi structured interview with safety professionals and workers, to verify and elaborate designs and any further issues uncovered. Protective Clothing has also become more functional, a fact emphasized by intelligent solutions and new materials.

With the interview conducted with the safety professionals & workers, the response is to conduct training to create awareness about the right way of usage of Protective clothing and awareness of the hazards of the respective process industry. The clothing designed should always be ergonomically fit. With Safety, comfort and fit, Style plays an important role. No discrimination to be done amongst workers and higher safety officials for the uniform designed to be 100% acceptable amongst all. The protective clothing should be similar to the uniforms worn by the workers to ensure greater acceptability by them.

In Design, fit is considered successful in PC when the needs of the wearer are achieved along with the required functionality of the garments. This is a delicate balance to achieve. Depending on the requirements of the situation, protective clothing could be a simple layer of fabric or a very complex and multi layered system.

The choice of materials, design parameters, fibre and fabric properties all play critical roles in the designing of protective clothing. In the entire blueprint response is targeting risk, working safer, working smarter and working together.

The exhaustive data collected by interviewing the workers, supervisors and engineers of process- based industries was analyzed. The analysis, suggested that though most of the workers wore PC, they were not comfortable with the protective clothing. The major reasons for not wanting to wear them was discomfort due to feeling too hot and that they felt the movement gets restricted. PC which are smart and with design aesthetics will help find a motivation for the workers to wear them. They all agreed that PC is essential for process based industries and also need training for knowing how to wear PC in the right manner.



The authors also interacted with senior officers in leading chemical industries dealing in toxic chemicals where use of PPE is compulsory. However there exists a problem of noncompliance of not using PPEs even when a maintenance job is carried out handling toxic chemicals. Many times the personnel get away by sheer luck. When enquired the usual answer is that these are uncomfortable or boring. Hence these PPEs have to be improved by use of modern fabrics that are comfortable. There is a need for comfort and fit that plays a part in durability, since garments that fit better wear better. The focus is on three areas: continuing & improving the high level of protection; increasing movement through the back and arms while bringing the garment closer to the body and improving on the look of PC to encourage the wearing compliance. Further by designing them fashionable; it would make them to want to wear them. This would greatly enhance compliance and prevent hazards. The results and discussion of the research lead the authors to come up with the following designs for the protective clothing.

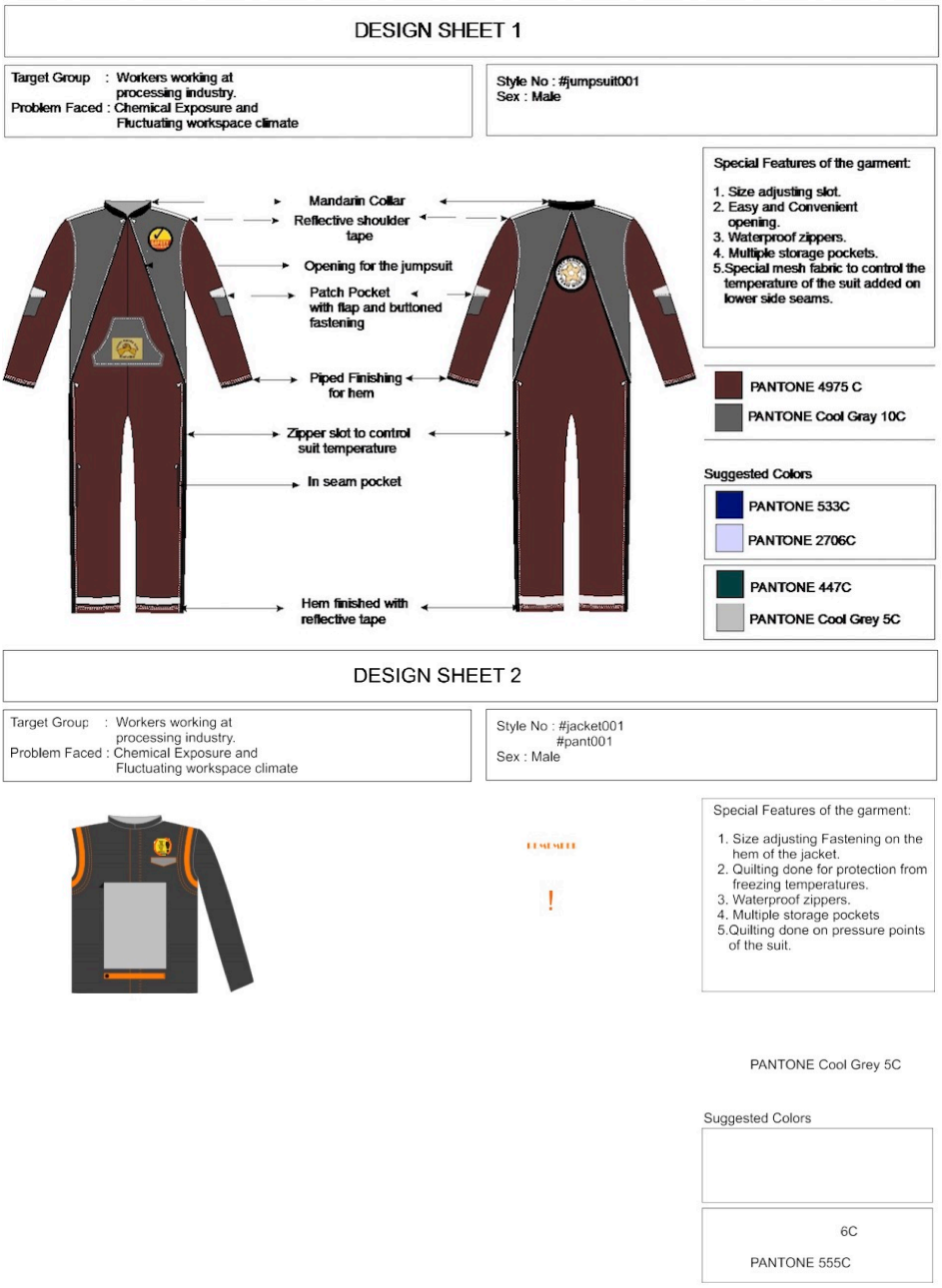
Design Solutions for Protective Clothing

The key elements followed while designing were:

- Adding a personalized or fun element to the typical existing PC
- Use of reflective tapes that add to aesthetics, and yet ensure maximum coverage for full visibility.
- Quotes and logos to encourage safety at the workplace.
- Use of mandarin collar, ribbed collars and hems, cuffs to ensure better resistance to the penetration of chemicals.
- Use of lightweight stretch fabric.
- Multi panel seam designs, raglan sleeves
- Flat seam constructions

- Tag less labels & Garments that fit better
- Increase in shoulder size and lengthening of zippers ad plackets for ease of getting in and out of the suits.
- Waistbands and areas prone to stress to be reinforced against wear and tear.
- Dark colors that cover the soiling and bright pop colors as hints for appeal

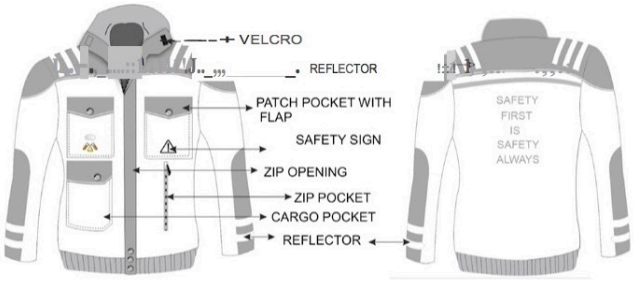
The research led the authors to come up with the following designs:



DESIGN SHEET 3

Target Group : Workers working at processing industry.
Problem Faced : Chemical Exposure and Fluctuating workspace climate

Style No :
Sex : Male



Special Features of the garment:

More number of panels for comfort
More number of pockets to keep tools

11989898
#FFFFFF

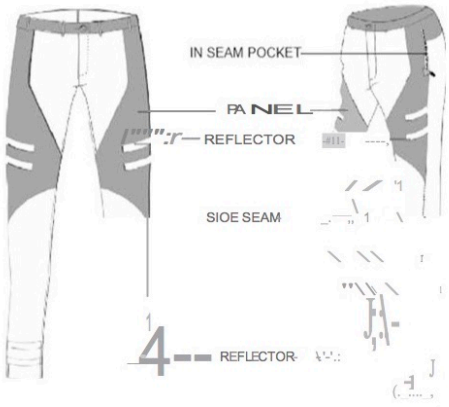
SUGGESTED COLOURS

#SE4520
#989898
#8DCEF7
#F1F1F1

DESIGN SHEET 4

Target Group Workers working at processing industiy
Problem Faced : Chemical Exposure and fluctuating workspace climate

Style No :
Sex : Male



Special Features of the garment

Grey panels are padded to avold cold
More number of panels tor comfort
Narrow fitted pants

#989898
#FFFFFF

SUGGESTEO COLOURS

#FS8634
#000066
#E6E6E6
#S1A781

DESIGN SHEET 5

Target Group : Workers working at processing industry.
Problem Faced : Chemical Exposure and Fluctuating workspace climate

Style No :
Sex : Male

Special Features of the garment:

The patch pocket is in a V-shape,so that the tools kept in it don't move.
The panels in the front are tor greater comfort and could be padded tor working under extreme condions.

#150C42
#818181

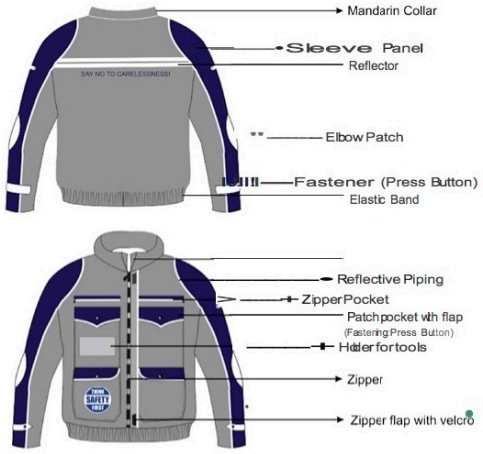
SUGGESTED COLOURS

#FDA803
#818181
#389278
#818181

DESIGN SHEET 6

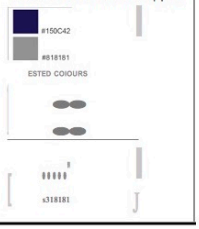
Target Group : Workers working at processing industry.
Problem Faced : Chemical Exposure and Fluctuating workspace climate

Style No :
Sex : Male



Special Features of the garment:

The panels in the sleeve will have foam padding for workers working under extreme conditions.
The holder for tools to hook equipments like walkie takie, pens, pliers, etc.
The paneled sleeve also adds extra comfort.
The mandarin collar has a velcro for folding it downwards when not required.
A velcro nap is attached to the center front to hide the zipper.



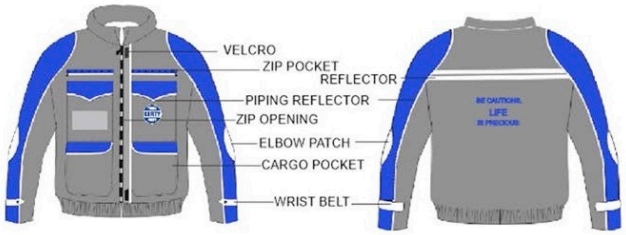
DESIGN SHEET 7

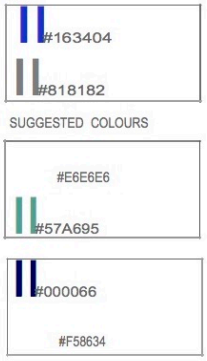
Target Group : Workers working at processing industry.
Problem Faced : Chemical Exposure and Fluctuating workspace climate

No. Hjoo003
Sex Male

Special Features of the garment:

Blue panels are padded to avoid cold
More number of panels for comfort
More number of pockets to keep tools





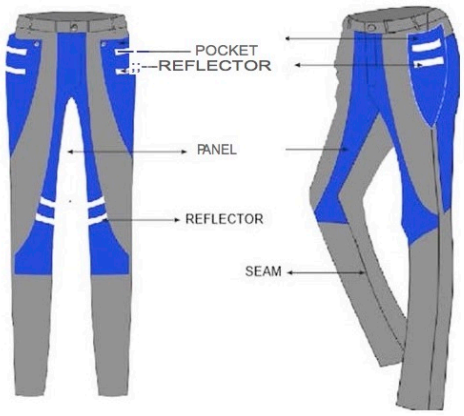
DESIGN SHEET 8

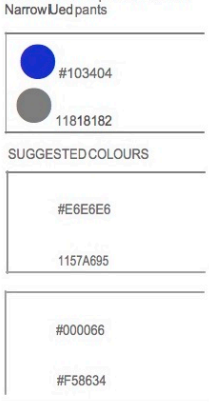
Target Group Workers werking at processinghdustry
Problem Faced : Chemical Exposure and Fluctuating workspace climate

S•lo No Hi>'MOOI
Sex : Male

Special Features of the garment:

Blue panels are padded to avoid cold
More number or panels for comfort
Narrow Used pants





DESIGN SHEET 9

Target Group : Workers working at processing industry.
Problem Faced : Chemical Exposure and Fluctuating workspace climate

Style No :
Sex : Male

Special Features of the garment:

- The air vents in the jacket ensure air circulation.
- While using electrical appliances, a high stand collar isn't required, where as while working with chemicals, a high collar is a must. And hence, the collar can be attached or detached as per required.
- The reflective patches are to add a decorative element.
- The patches denote the function of the garment i.e. protection from hazardous chemicals and electricity.

#2C2D3D
#313366
#F58634
#E96A37

DESIGN SHEET 10

Target Group : Workers working at processing industry.
Problem Faced : Chemical Exposure and Fluctuating workspace climate

Style No :
Sex : Male

Special Features of the garment:

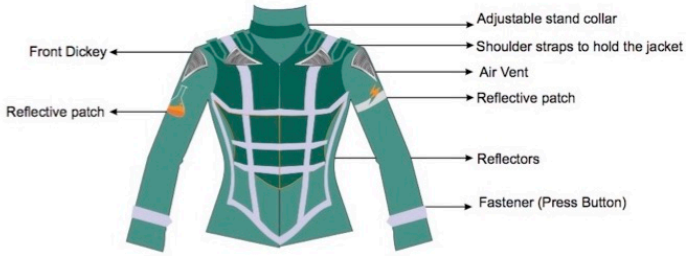
- The pocket is big an deep enough for the hand to go inwith the gloves on.

#2C2D3D
#313366
#F58634
#E96A37

DESIGN SHEET 11

Target Group : Workers working at processing industry.
Problem Faced : Chemical Exposure and Fluctuating workspace climate

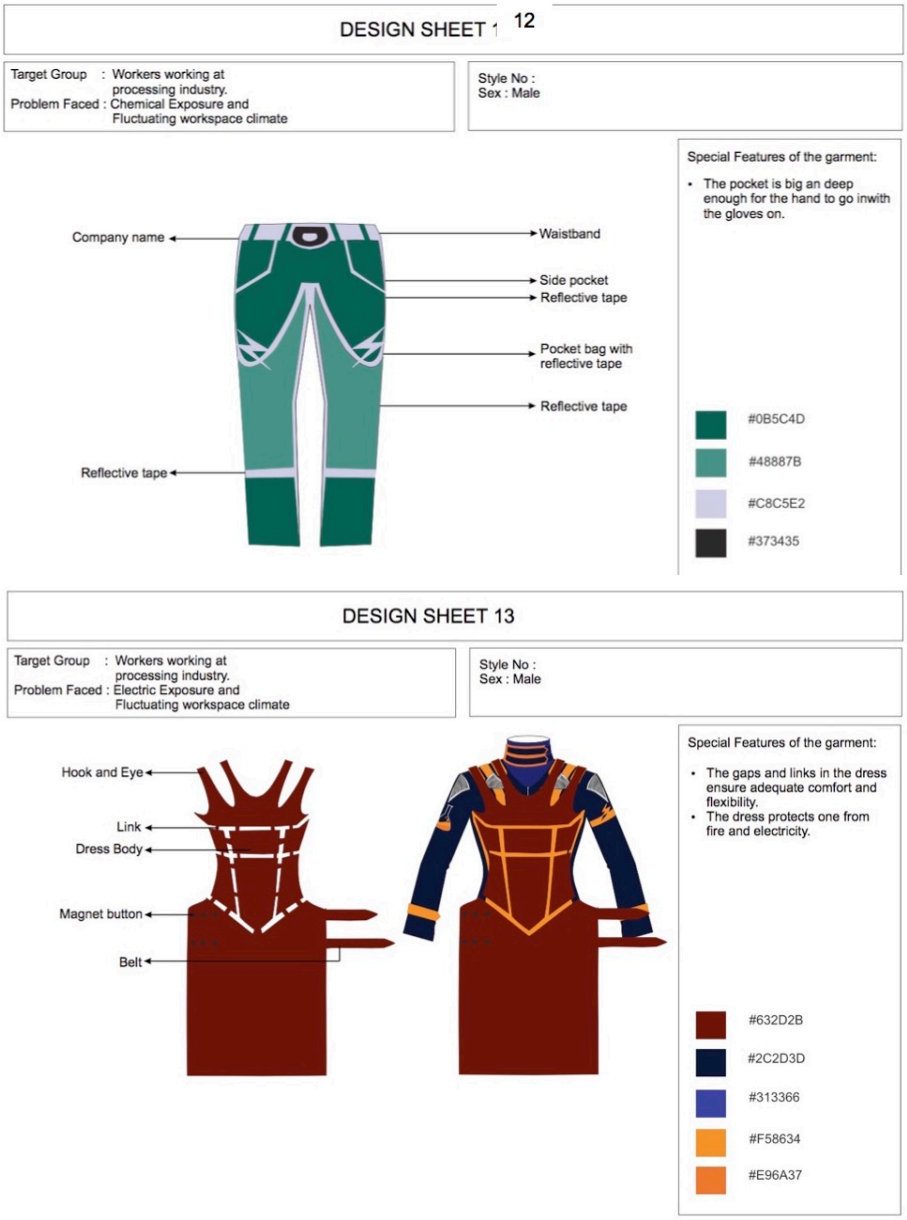
Style No :
Sex : Male



Special Features of the garment:

- The air vents in the jacket ensure air circulation.
- While using electrical appliances, a high stand collar isn't required, where as while working with chemicals, a high collar is a must. And hence, the collar can be attached or detached as per required.
- The reflective patches are to add a decorative element.
- The patches denote the function of the garment i.e. protection from hazardous chemicals and electricity.

#0B5C4D
#48887B
#C8C5E2
#373435



Conclusion

In the range of every day fashion the design is a mean of achieving a positive reaction of an observer and potential customer. It is human nature to respond on visual experience of an object, meaning the surroundings objects as well as clothing and other product for personal everyday use. This visual experience and psychophysical reaction have a crucial impact on drawing the decisions about accepting or rejecting certain product. Aesthetic design can affect the success or failure of a clothing system through the way it makes the user feel, allows for personal expression, and generally enables the physiological functions of clothing. The importance of human reaction on positive visual impulses and aesthetics should be considered as an important factor also in the field of highly specified, protective textiles and clothing in professional and personal wear. The evidence is growing that fashion also affects the way protective clothing is perceived. This is also seen, as there are now fashion shows specially to exhibit protective clothing. One such fashion show is A+A, held at Dusseldorf, Germany.

The present protective clothing has been many times evaluated mainly from the viewpoint of its protective performance. However, according to the ever-increasing requirements for protective clothing, the end user

expects more comfortable and functional protective clothes. This has resulted in changes in approach when designing and evaluating individual components of a clothing system. This attempt at making a user-needs driven design methodology to address a breadth of technical, functional, physiological, social, cultural and aesthetic considerations that impinges on the design of clothing with embedded technologies. These aesthetically rich protective wear not only ensures safety of the wearer, but also comes with comfort and the wish to wear it instead of compulsion. This practice will also promote uniformity in the industries, when not just workers but supervisor and safety officials adorn these uniforms, and aesthetics play a vital role in motivating them.

> *" For you to sleep well at night, the aesthetic, the quality, has to be carried all the way through." -Steve Jobs*

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Annexure 1

INTERVIEW SCHEDULE
(For the Scientist/Supervisors/ Technical Engineer/Safety Professionals)

1. Name:

2. Age:

3. Designation: i) Safety Professional ☐
   ii) Scientist ☐
   iii) Head of Department ☐

iv) Full time supervisors ☐
v) Part time supervisors ☐
vi) Technical Director ☐
vii) Any other, Please specify ☐

4. Address: Company Name :

Region : i) Northern ☐
ii) Southern ☐
iii) Central ☐
iv) Western ☐
v) Eastern ☐
vi) Any other, Please specify

5. Years of Experience in the Process Industry

i) < 5 years ☐
ii) 5 – 10 years ☐
iii) > 10 years ☐

6. Educational Qualification:

i) < 10th ☐
ii) Diploma ☐
iii) Technical Graduate/ Engineer ☐
iv) Other Graduate ☐
v) Post Graduate ☐
vi) MBA/MMS ☐
vii) Doctorate ☐
viii) Any Other, Please Specify_

7. Work Description: :

i) Safety Professional ☐
ii) Technical Supervisor ☐
iii) Supervisor ☐
iv) Head of Department ☐
v) Any other, Please specify

8. Number of Employees:

i) Male a) < 10 b) > 10 ☐
c) Any other, Please specify ☐

ii) Female a) < 10 b) > 10 ☐
c) Any other, Please specify ☐

9. Number of Shifts in a day:

i) 1 ☐
ii) 2 ☐
iii) Any other, please specify

10. Duration of shifts:

i) < 8 hours ☐
ii) 10 hours ☐
iii) 12 hours ☐
iv) Any other, please specify

11. What is the Industry manufacturing?

i) Technical Grade Products ☐
ii) Formulations ☐
iii) Both ☐

12. If Formulations are manufactured in the plant then describe, What type?

i) Liquid ☐
ii) Granular ☐
iii) Powder ☐
iv) Other (Specify_)

13. What type of clothing do workers normally wear while working in the manufacturing plant? (check all that apply)

Male:

i) Uniform ☐
ii) Overalls ☐
iii) Pant and Shirt ☐
iv) Kurta and pajama ☐
v) Other (Please specify)

Female:

i) Uniform ☐
ii) Salwar Kameez ☐
iii) Sari ☐
iv) Other (Please specify

14. If the uniform is regularly worn, is it worn as over-clothing / substitute of personal clothing?

15. what is the typical type of fiber in clothing worn by workers (check all that apply)

a. Cotton ☐
b. Terrycot ☐
c. Vinyl/plastic ☐
d. Other (Please specify)

16. Do workers wear Protective Clothing?

If not, what could be the reasons for not wearing it?

- Not required ?(Why)
- Not provided by the unit
- Too expensive
- Not aware of the hazards/ dangers of chemicals
- Uncomfortable to wear in hot/humid climate
- Any other reason (Specify)

17. How would you rate the need of protective clothing for workers exposed to chemicals? Give reasons for the response

- Essential
- Occasionally required
- Not required

18. Is the Protective clothing/uniform washed at home or at unit?

19. What role do comfort and fashion play in the selection of Protective Clothing?

20. How much money has been allocated for the protective clothing/uniform?

21. From where do you procure the protective clothing/ uniform?

22. Are you conducting any " in house" safety programme for the workers? If yes, how often?
- At the time of joining
- Regularly

23. Do you think there should be different sets of uniforms for summer and winter?

24. Is there any legislation available concerning the safety of workers?

25. In the past have you come across any skin problems or other medical problems among the workers, which you think are due to exposure to chemicals?

If yes, please specify.

26. If protective clothing is provided for the workers in your industry, would you like to adopt it for your unit? If yes, how much money are you ready to spend for the same?

27. According to you for your process based industry, which areas of body need maximum protection from harmful chemicals effects?

28. For the Protection of workers against hazardous effects of chemicals, what all accessories are used? Specify with the material used for the same.

29. What suggestions would you like to give about the following aspects of protective clothing:
    a. Type of fibre used
    b. One piece/ two piece
    c. Woven/Non woven
    d. Cap – Fabric, Plastic

30. How can we increase the acceptability of Protective clothing among the workers? Any Other Comments:

A Novel Approach to Fit Analysis of Virtual Fashion Clothing

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KEYWORDS

Virtual Prototype, Drape Behaviour, Virtual Fit, 3D CAD, Tension Map

ABSTRACT

A number of 3D design systems are available on the market for use in the fashion industry. They support simulation of 2D pattern pieces on an adjustable virtual mannequin to visualise the 3D appearance of fashion clothing. This offers an opportunity to check fit and pattern flaws in the virtual state so that the initial 2D pattern pieces might be refined. This enables faster detection of any error and earlier correction of design elements, material selection and assembly technique to reduce the dependency on physical prototyping and to shorten the development lead-time and the associated costs. At the same time, virtual prototypes can be used as a marketing aid for online product presentation and Internet-based retailing. However, published literature reveals that only visual presentation and analysis of drape simulation is solely not enough to ensure the meaningful use of such tools in the fashion-product- development process, especially in the situation of decision- making on accepting or rejecting a virtual prototype, or altering pattern pieces to achieve the desired fit.

This paper discusses an objective approach to virtual fit analysis by identifying and analysing three technical parameters of virtual drape, namely tension (gf/cm), stretch (%) and pressure (dyne/cm2 or gm/cm2), that work on virtual clothing. Digital pattern pieces of ladies' blouse with varying eases were drafted using a clothing CAD system; a female avatar was appropriately adjusted using the extracted average measurements from a set of body-scan data before simulating virtual blouse on to it. For use in virtual simulation, the physical and mechanical properties of a selected woven fabric were tested by the FAST (Fabric Assurance by Simple Testing) system. Findings indicate that the change in drape parameters (tension, stretch, and pressure) follows a definite pattern when the ease is varied within the pattern pieces keeping the fabric properties unchanged. This correlation between ease and virtual drape parameters leads to the development of a novel technique of virtual fit analysis by combining the objective technique (numerical analysis) with the prevailing subjective technique (visual analysis). It is expected that this approach to fit analysis of virtual clothing will make the available virtual simulation tools more meaningful and useful to the designers, fit technicians and pattern cutters in the industry.

Introduction

Although computer-aided design (CAD) systems for virtual fashion prototyping are available on the market since 2001 (Goldstein, 2009), they have found only a very limited application in the fashion industry so far. It claimed by the suppliers that such systems can ensure better communication of design throughout the supply chain and can offer a reduction in time and costs of product development (Ernst 2009). Within the

available CAD systems, it is possible to rotate a virtual prototype in 360° for visual analysis of appearance and fit. At the same time a technical analysis using the tension, pressure, stretch and ease maps is also possible (Lim and Istook, 2011; Sayem, 2016). It is reported that the visual analysis is solely not enough for evaluating the virtual fit as the appearance of a virtual prototype can significantly differ from that of a real prototype (Kim, 2009; Lim, 2009 and Kim and LaBat, 2013). Often wrinkles are not accurately reproduced on virtual prototypes (Kim, 2009 and Kim and LaBat, 2013) and the visual appearance of simulated garments from identical material properties may differ in the system-to-system (Lim, 2009). Power et al. (2011) found that fabrics with vastly different properties appeared to have a very similar appearance in virtual simulations. This demands the use of an objective approach to the meaningful evaluation of virtual fit of clothing.

Wu et al. (2011) presented an objective approach to fit analysis of virtual clothing but their approach did not correspond to the fit analysis practice followed in the industry and neither utilised the fit evaluation tools offered in 3D CAD systems. Lim and Istook (2011) and Sabina et al. (2012, 2014 and 2015) utilised the colour coding of stretch and tension maps to evaluate fit in addition to drape image. However, they did not check the numerical value of tension working on the strained area to help decision-making. Porterfield (2015) applied the ease map to validate the fit of virtual costume but did not utilise any tension, pressure or stretch values. Power (2013) reported that virtual clothing prototypes with an insignificant visual difference could exhibit significant differences in pressure map. However, taking a decision based on visual analysis of colour codes or bands of tension, pressure and stretch maps is also a subjective approach and this can be quite misleading too. The colour bands of the tension maps from two different fabrics may look almost similar but maximum tension values may be far different from each other (Sayem, 2016). In order to quantify the virtual fit, it is first necessary to identify the correlation of the virtual drape parameters with the factors that cause a good or bad fit. After experimenting with men's virtual shirt, Sayem (2016) reported that the virtual drape parameters, such as tension (gf/cm), stretch (%) and pressure (dyne/cm2 or gm/cm2), exhibited good correlation with the change in ease and dimension of pattern pieces. This paper investigates the correlation between the change in ease in the bust area of pattern pieces and the change in virtual drape parameters of ladies blouse and it explores the concept of a "virtual fit prediction system" similar to the computerised 'colour matching system (CMS)' already in use in the industry. It is expected that the combination of this objective approach (i.e. numerical analysis of drape parameters) presented in paper with the prevailing subjective technique (visual analysis) will make the available virtual simulation tools more meaningful and useful to the designers, fit technicians and pattern cutters in the industry.

Methodology

The starting point of producing a virtual clothing prototype is to prepare an accurately sized and shaped avatar on which digital pattern pieces can be wrapped for drape simulation based on material properties. Accurate body measurements are necessary for drafting pattern pieces and for adjusting avatar dimensions within the 3D CAD environment. It was intended to prepare a set of pattern pieces of ladies' blouse in size "12" with varying eases around the bust girth. The BS 3666: 1992 (Specification for the Size designation of women's wear) provides a range of bust girth measurement from 86cm to 90cm for size '12' women. As suggested in Aldrich (2015), a bust girth of 88cm was selected as a control measurement for 12-sized women. Appropriate body measurements for pattern drafting and avatar dimensions were derived from body-scan data as described in the next sub-section. One commercial clothing CAD system with 2D and 3D modules was used for pattern drafting and implementing virtual simulation parts of this research. A poplin fabric of 35% cotton 65% Polyester was collected locally to test its mechanical properties by the FAST (Fabric Assurance by Simple Testing) system for use in virtual simulation.

Body Scanning & Measurement Extraction

In order to identify the representative body measurements of British women with an average bust girth of 88cm, a set of 66 female body-scans with the bust measurement ranging from 87cm to 89cm (with an average of 88cm) was identified from a data bank of body-scans, which has been developed in our institute by scanning interested female subjects using a KX-16 body-scanner (TC^2, USA). Appropriate ethical measures were taken before and after the collection of body-scan data; each subject (aged over 18) voluntarily singed a consent form prior to body scanning and provided unrestricted clearance to capture, store and use of their scanned data for research purpose. The absolute anonymity of the participants has been ensured to maintain the confidentiality policy.

The KX-16 proprietary software system (version 2.2.1) was used to process the captured point-clouds as reduced body data (RBD) in *.rbd format and to inspect all the landmark locations prior to the measurement extraction from them. A measurement extraction protocol (MEP) was written to extract measurements from each of the body-scans within TC2 system. The definitions of the major measurement parameters considered in the MEP (see Figure 1) are presented in Table 1. Finally, the body measurements from all female body scans were extracted into a Microsoft Excel sheet using the 'Batch Process' tool of the KX-16 software. The average body measurements, as can be found in Table 2, were used for drafting pattern pieces and for preparing avatar for garment simulation.

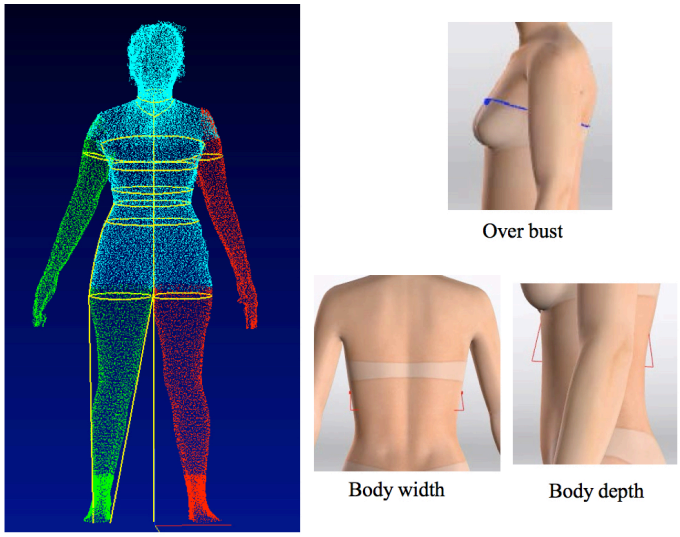


Figure 1: Major Measurement positions as defined in table 1

Table 1: Definitions of major measurement parameters in TC2 KX-16 MEP

Measurement Parameters	**Definitions in KX-16 MEP**
Cervical Height	Back neck height from floor
Neck Column girth	Measured at the middle of the neck where the collar of a dress shirt is usually positioned.
Neck base girth	Usual neck measurement at the neck base. It goes through the front neck point and the two side neck points
Overbust girth	Measured at an inclined plane above the bust at front and under the armpit (see Figure 1).
Bust girth	Measured at horizontal plane at the bust point level
Under Bust girth	In TC^2 system, it follows the 'under bust' definition measured using a horizontal plane.
Body width	Width at under bust position (see Figure 1)

Body depth	Different between the Front_X and Back_X at under bust position (see Figure 1). In TC^2 system, Front_X: is the distance of the front most point of the circumference from an imaginary plane 1 meter behind the crotch point. Back_X: is the distance of the rear most point of the circumference from an imaginary plane 1 meter behind the crotch point.
Waist	Smallest circumference around the torso within the 0 to 4 cm limits of centre back point height to locate 'small of back', which is roughly at the top of the pelvis.
High hip girth	Measured at a 75% distance between hip and back waist
Hip girth	The largest circumference between 90% distance from crotch to waist
Thigh girth	The largest circumference at a position between 2.54 cm below the crotch and knee.
Low thigh girth	Measured at 50% distance from knee to crotch
Arm Length	Measured from shoulder point to wrist
Upper biceps girth	2.5 cm above biceps
Bicep girth	The Biceps are found at 5.08 cm (i.e. 2 inches) below the armpit. It is not the largest circumference of the upper arm.
Outseam	Average of the distances above the floor of the left or right waist points.
Inseam	It follows the inside of the leg like a tape measure would do.

Table 2: Average Measurements from body-scans and effective Avatar measurements

SL	Measurement Parameters	Average measurements (cm)	Effective Avatar measurements (cm) in 3D CAD system
1	Height	165.27	165.27
2	Cervical Height	142.20	142.20
3	Neck Column girth	32.23	32.23
4	Neck base girth	35.26	35.26
5	Shoulder slope	5.54	5.54
6	Across shoulder	36.15	36.13
7	Overbust girth	85.75	85.75
8	Bust girth	88.12	88.12
9	Bust point to point	18.22	18.22
10	Bust point from High Point Shoulder (vertical distance)	21.02	21.02
11	Bust Height (from floor)	119.99	nn

12	Bust width	28.5	28.5
13	Across back	31.75	nn
14	Under bust girth	74.08	74.08
15	Under bust Height	113.57	113.57
16	Body Width	26.12	25.39
17	Body Depth	19.85	19.85
18	Waist girth	70.83	70.83
19	Waist to Hip	24.61	24.61
20	Back waist from Centre Back	40.47	42.47
21	Front Waist from Centre Front	34.33	36.33
22	High hip girth	80.86	80.86
23	High Hip Height	97.09	94.11
24	Hip girth	99.38	99.38
25	Hip Height	78.64	79.38
26	Thigh girth	55.72	55.72
27	Low thigh girth	46.77	46.77
28	Low thigh height	60.56	60.56
29	Knee girth	36.14	36.14
30	Knee height	45.38	45.38
31	Calf	35.09	35.09
32	Calf height	33.06	33.06
33	Ankle girth	24.15	24.15
34	Ankle height	7.59	11.74
35	Arm Length/overarm	54.86	54.86
36	Armscye girth (Armhole)	37.18	nn
37	Armscye Height	131.70	nn
38	Armscy depth	16.08	16.08
39	Upper biceps girth	28.06	28.06
40	Bicep girth	27.20	27.88
41	Elbow girth	22.58	22.08
42	Forearm girth	22.70	nn
43	Wrist girth	14.84	14.84
44	Outseam	104.33	102.27
45	Inseam	76.50	76.50
nn = not necessary			

Pattern Drafting

13 pairs of front and back panels with variable eases starting from 0.0 cm to 12 cm at the bust area at an interval of 1.0cm were drafted in the 2D window of the CAD system following the pattern cutting instructions for 'easy fitting bodice block (woven fabrics)' presented in Aldrich (2015). Below measurements for front and back parts (see Figure 2) of women's blouse.

Bust girth: 88 cm with variable ease from 0.0 to 12.00 cm at every 1.0 cm interval;

Shoulder: 11.44 cm;

Nape to waist: 39 cm

Back width: 31.75 cm;

Waist to hip: 24.61cm;

Armscye depth: 16.08 cm;

Back neck to waist: 48 cm;

Neck Size: 35.26 cm;

Over bust width/chest: 34.52cm

Front Dart: 7cm

The pattern for sleeve was drafted pattern cutting instructions for 'one-piece sleeve block' presented in Aldrich (2015) using the below measurement.

Sleeve length: 48.5 cm.

Figure 2 shows the drafted outlines of the front, back and sleeve patterns. The front and back parts of the blouse were extracted from the outlines using tracing tools of the CAD system and finally mirrored to get the complete front and back parts. The drafting technique of Aldrich (2015) does not take the upper bicep girth and bicep girth into account for drafting the sleeve pattern. It has been found that the width of the sleeve pattern at the crown zone drafted following Aldrich (2015) was smaller than the upper bicep girth mentioned in Table 1. Therefore the width of the sleeve was adjusted to 28.1 cm.

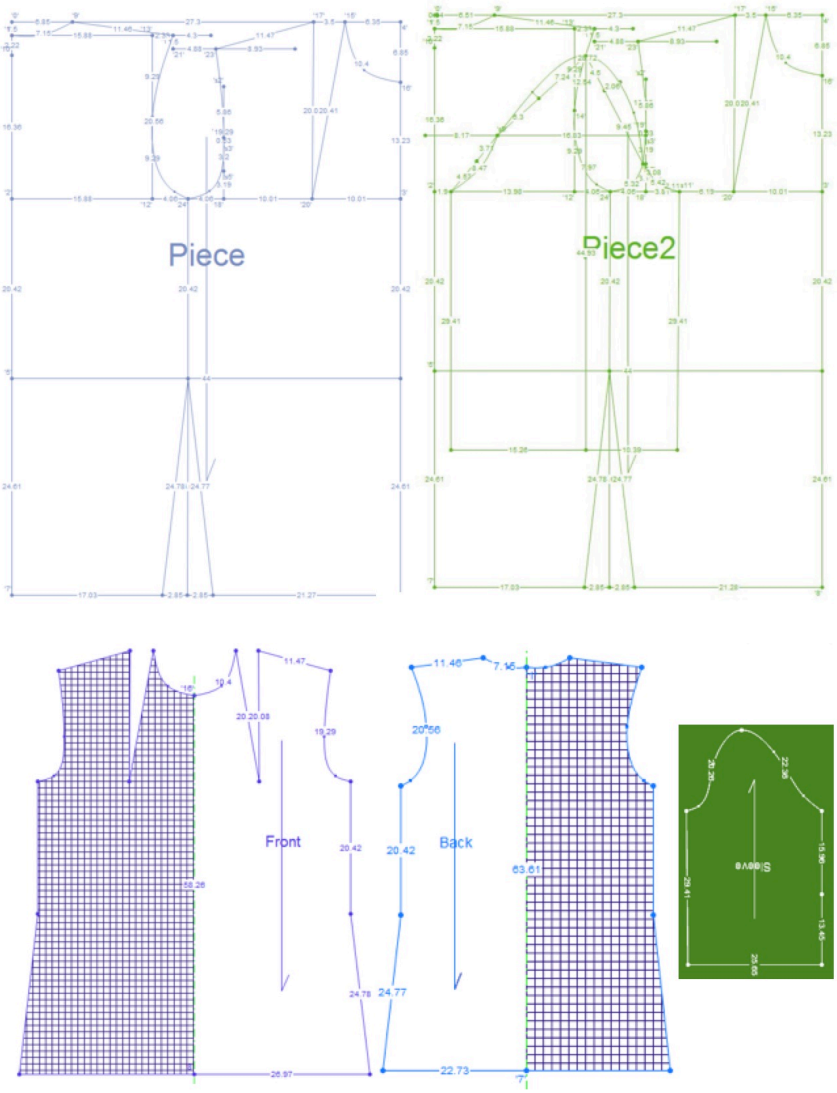
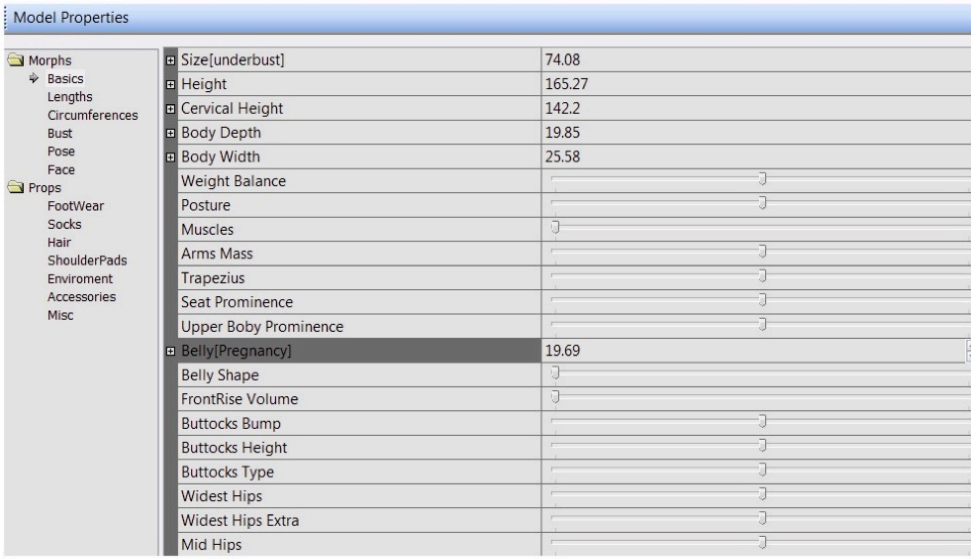


Fig 2: Drafted Outlines (top) and Extracted pattern pieces (bottom)

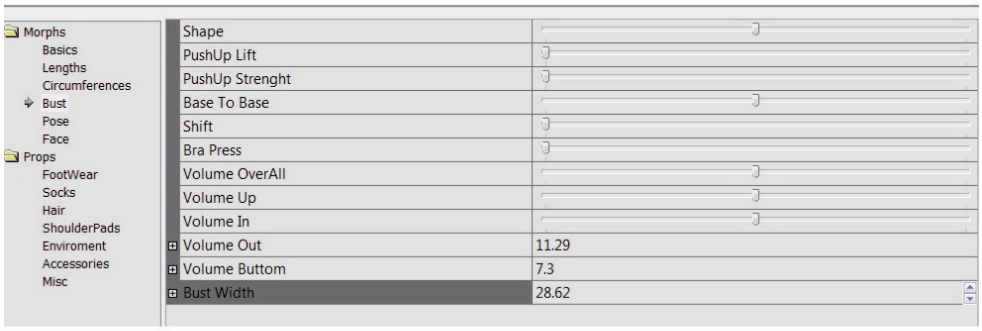
Avatar Morphing

An appropriate female model namely "PFA_EVA.mod" was selected from the mannequin library of the CAD system to manipulate its size and shape in order to reproduce the anthropometry of an average 12-sized British woman using the measurements given in Table 2 Under five functional morphing categories, namely ***basics, lengths, circumferences, bust*** and ***pose***, this CAD system uses in total 86 criteria to modify or adjust the anthropometric properties of a female figure. Out of these 86 criteria within the 'model properties window', 48 criteria accept numerical inputs of measurements. Remaining 38 criteria offer only sliding bars (see Figure 3) to adjust measurements instead of any option for inputting numerical values directly. Out of 48 criteria that accept numerical inputs, 45 could be adjusted using the measurements extracted from body-scan data as presented in Table 02. For 3 criteria namely belly (pregnancy), bust volume out and bottom there are no measurements available from body- scan data as these are not commonly used parameters for apparel construction and there are also no definition for them is available in BS EN 13402-1:2001 (Size designation of clothes- Part 1; Terms, definitions, and body measurements procedure). Therefore these three criteria can also be adjusted by sliding bar movement (see figure 3).

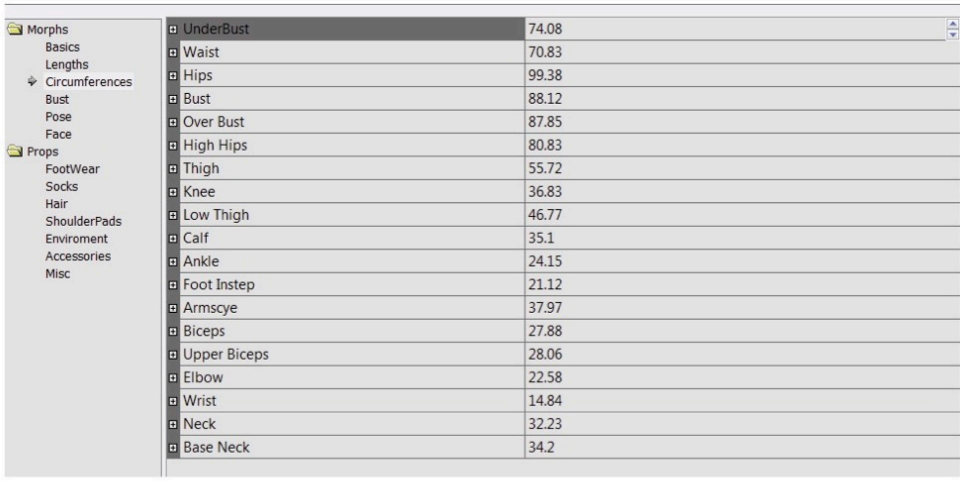
It has been experienced while morphing the body size and shape of the female mannequin of CAD system using the average body measurements (Table 1) of British 12-sized female figures that the software system does not provide absolute freedom to modify all of the morphing criteria. As some of the criteria are inter-related as programmed by the supplier, the values of body width, back and from the waist, hip and high hip height, ankle height, bicep girth and out-seam were not fully accepted by the system, as presented in table 1



a) Basics



b) Bust



c) Circumferences

Figure 3. Avatar Morphing Windows of 3D CAD system

Fabric Parameters for Simulation

The physical and mechanical properties of fabric which are required for realistic drape simulation are weight, thickness, resistance to bending, resistance to stretch, resistance to shear, the coefficient of friction etc. (Luibe and Magnenat-Thalman, 2007 and 2008). Ideally, these need to be measured in a low force environment that corresponds to the loads a fabric is likely to undergo during garments manufacturing and wear (Sayem, 2016). The KES-f (Kawabata Evaluation System for fabrics) and FAST are two commonly used objective evaluation techniques that measure mechanical properties of fabrics under low force unlike the traditional physical and mechanical test methods described in ISO (International Organization for Standardization) and ASTM standards. It is reported that few companies, for example, Browzwear and OptiTex, have recently introduced their own fabric testing kits to get parameters for drape simulation and took away the KES-f and FAST data converters from the latest releases of their software packages. However, these newly commercialised fabric testing systems need standardisation (Power, 2013), approval, and accreditation from the international standardisation bodies to be able to be used with confidence in the industry. The KES-f parameters were used by Breen et al. (1994) and Eberhardt et al. (1996) to simulate virtual clothing. The FAST system was used by Kim (2009), Lim (2009), Lim and Istook (2011), Wu et al. (2011) and Kim and LaBat (2012) for simulation of garments on a virtual mannequin.

FAST Testing

In this research, a shirting fabric as mentioned in Table 03 was tested by a FAST system for deriving the required parameters for use in virtual simulation. The fabric was conditioned as per BS 139 - 2005 and all the tests were carried out in the standard atmosphere (20°C temperature and 65% RH).

The FAST system, also known as SiroFAST, consists of the following three instruments and a test method:

- SiroFAST-1 (a compression meter that measures fabric thickness);
- SiroFAST-2 (a bending meter that measures the fabric bending length);
- SiroFAST-3 (an extension meter that measures fabric extensibility); and
- SiroFAST-4 (a test procedure for measuring dimensional properties of fabric).

The SiroFAST-1 'compression meter' defines surface thickness (ST) as the difference in the fabric thicknesses T2 and T100 measured at two different loads: 2 gf/cm^2 (19.6 mN/cm^2) and 100 gf/cm^2 (981 mN/cm^2) respectively, i.e., ST = T100-T2.

The SiroFAST-2 'bending meter' measures fabric bending lengths in warp and weft directions using the cantilever bending principle, as described in British Standard Method BS:3356 -1961. From the values of bending length obtained, the bending rigidity of the fabric is calculated using the eq. 1.

$$\text{Bending Rigidity, B } (\mu\text{N.m}) = 9.81 \times 10^{-6} \times WC^3 \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where C is the bending length measured in mm and W is the fabric weight in g/m^2

The SiroFAST-3 'extensibility meter' measures the extensibility of a fabric under three different loads namely 5, 20 and 100 gf/cm (i.e 4.9, 19.6 and 98.1 N/m). The loads are chosen to simulate the level of deformation the fabric is likely to undergo during garment manufacture. SiroFAST-3 also measures the bias extensibility of the fabric (at 45° to the warp direction) under a low load (5 gf/cm). Bias extensibility is used to calculate shear rigidity using the eq. 2.

$$\text{Shear Rigidity, G (N/m)} = 123/EB5 \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where EB5 is the bias extensibility in %.

Table 3: Fabric Parameters for Virtual Simulation

Fabric Type: Shirting; **Composition**: 35% Cotton 65%Polyester			
Construction: Ends: 45/cm; Picks:31/cm; 1/1 Plain weave			
FAST Data		**Converted Data for CAD System**	
Parameters (Unit)	**Value**	**Parameters (Unit)**	**Value**
Extensibility (%) at Warp [E100-1]	1.07	Resistance to Stretch (g/cm) at warp	3605.76
Extensibility (%) at Weft [E100-2]	1.8	Resistance to Stretch (g/cm) at weft	2136.75
Bending Rigidity (μN.m) at Warp	9.07	Resistance to Bend (no unit) at warp	906.89
Bending Rigidity (μN.m) at Weft	4.02	Resistance to Bend (no unit) at weft	401.72
Shear Rigidity (N/m)	103.94	Resistance to Shear (no unit)	1039.44
Thickness (mm)	0.148	Thickness (cm)	0.0148
Weight (gsm)	110	Weight (gsm)	110

Parameter Conversion for Virtual Simulation

The fabric parameters required by the selected CAD for virtual simulation of garments are weight (gsm), thickness (cm), resistance to stretch (gr/cm), resistance to bend (no unit) and resistance to shear (no unit). Definitions of last three parameters specific to the CAD system in use and their relationship with the FAST parameters are presented in Table 4. Expect weight (g/m^2), other parameters from the FAST test cannot be input directly to the 3D simulator.

Table 4: Parameters Definitions and relationship with FAST results

#	Fabric Parameters	Definitions used by the CAD system in use	Relationship with FAST parameters
1	Resistance to stretch	The resistance of the cloth to stretching forces in the warp and weft directions and it affects the elasticity of the fabric	can be derived from the Extensibility (%) [E100-1 & E100-2].
2	Resistance to bend	The resistance of the cloth to Bending forces that affects the rigidity of the fabric	can be derived from Bending Rigidity (μN.m)
3	Resistance to shear	The resistance of the fabric to shearing forces in the diagonal direction of the fabric and it affects the stiffness of a fabric when cut in bias direction.	can be derived from FAST parameter Shear Rigidity (N/m)

The fabric converter (shown in Figure 4) available in PDS 10 was used similarly to the work of Lim and Istook (2011) to convert all FAST parameters into the compatible parameters of the CAD system, as presented in Table 3. It should be noted that the conversion of resistance of Bend and Shear achieved from the fab-

ric converter of CAD system does not correspond to the known mathematical relationships of the relevant units, therefore those are mentioned as 'no unit' in Table 3. As the FAST system does not measure the coefficient of friction, a value of 0.15 is used following the findings of Ghani (2011), who reported that the coefficient of friction of medium weight fabrics weighing between 101 and 135 gsm) of polyester-cotton varied from 0.14 to 0.20.

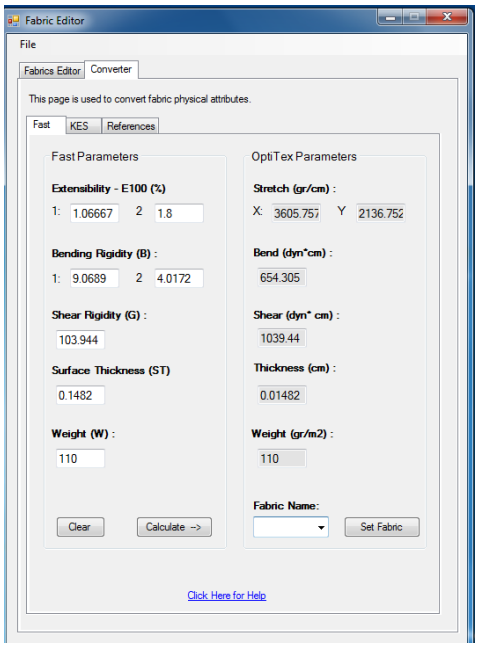


Figure 4. Fabric Converter of CAD System

Blouse Simulation

All front and back pattern pieces (13 pairs with varying eases starting from 0.0 cm to 12 cm at the bust area at an interval of 1.0cm as described in section 2.2) were simulated on the avatar described in section 2.3 within the 3D window of the CAD system. For each case, the simulation was done twice, with and without the sleeves. The process included: defining stitches and seam lines on the 2D pattern pieces (see Figure 5), defining the position and 3D shape of each pattern on Avatar, assigning fabric properties, placing pattern pieces on the avatar and finally running the drape simulation engine (see Figures 5 &6). During the simulation, the relevant properties such as gravity, world damping, bending, and time step, iteration per frame, stitch constant and stitch damping were maintained as a default setting, as presented in Figure 7.

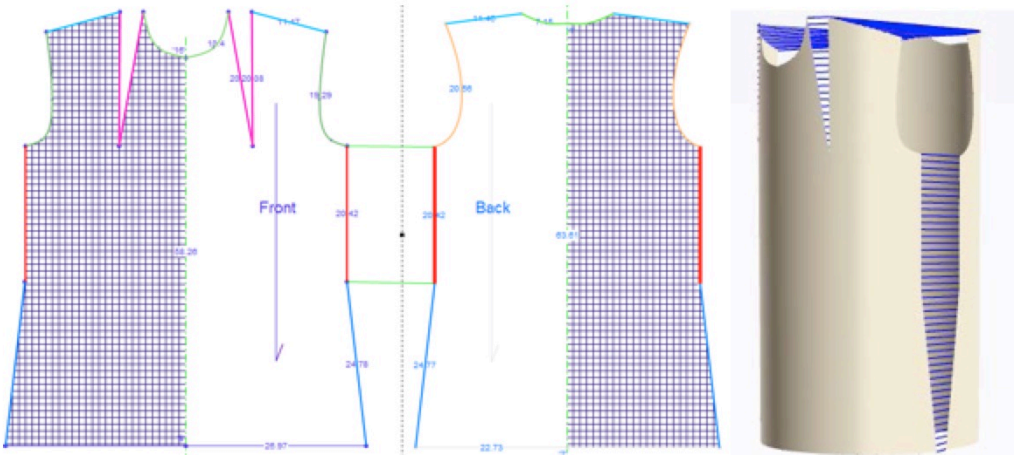


Figure 5. Definitions of Stitches and Seamlines (2D & 3D Views)

Figure 6. Pattern Placement on Avatar (left) and Virtual Blouse after Simulation

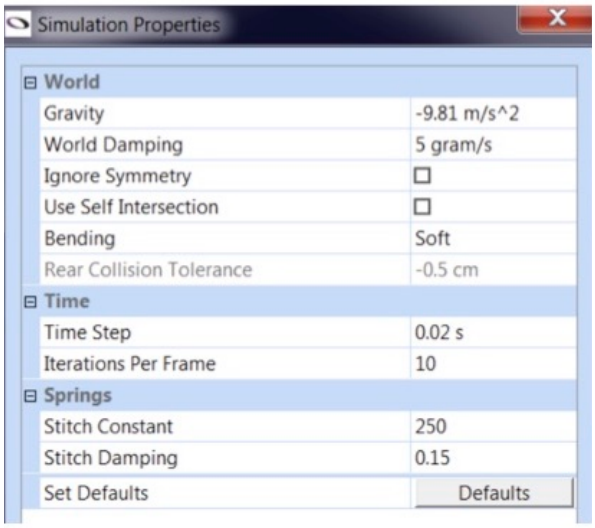


Fig. 7 Simulation Properties used in 3D CAD System

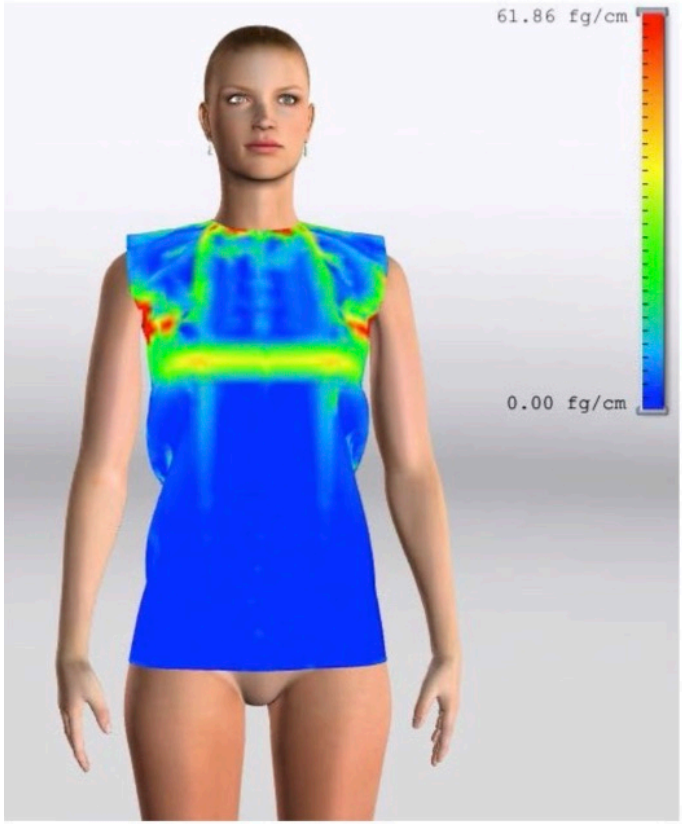
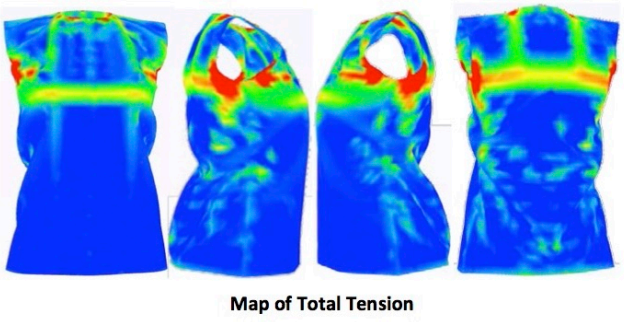
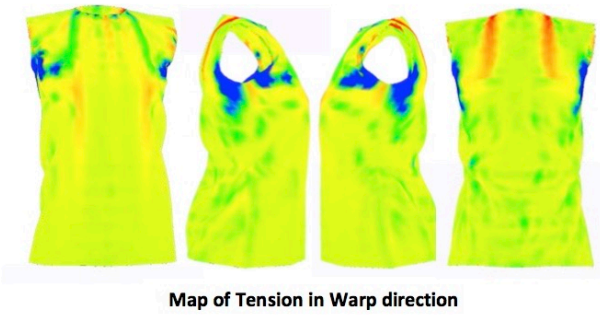


Figure 8. Tension map of Sleeve-less blouse with no Ease at the Bust area

Analysis of Drape Parameters

Three virtual drape parameters namely tension (gf/cm), stretch (%) and collision pressure (dyne/cm2) were analysed to evaluate the fit of virtual blouses simulated from each and every pairs of patterns mentioned in section 2.2. The amount of virtual tension (i.e. the forces working in unit length) influencing the cloth was analysed in three ways, namely total tension [see Figure 8] and tensions in the warp and weft directions. The colour band on the tension scale ranges from blue through green and yellow to red where blue stands for minimum and red stands for maximum values of virtual tension. Similarly, the amount of fabric expansion is analysed in three ways, namely total stretch and stretches along the warp and weft directions were analysed. The stretch scale is also similar to tension scale in terms of colour coding. Additionally, the normal collision pressure (dyne/cm2) at the contact point of virtual fabric and skin of the virtual mannequin was also analysed. The simulation tool was run for three times for every pair of pattern pieces to get a stable simulation before recording the values of tension, stretch, and collision pressure. The maximum values were then identified by hovering the mouse pointer on the bust area covering both left and right sides of the body up to the armhole.





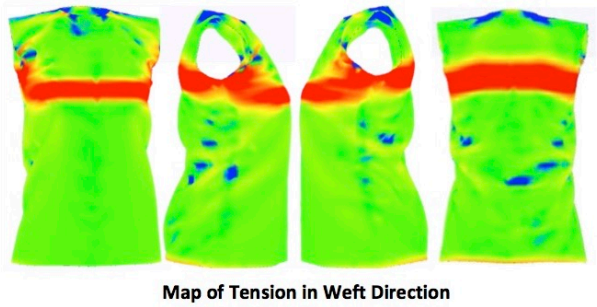


Figure 9. Different views of Tension maps on Sleeve-less blouse with no Ease

Results & Discussion

Virtual Blouse without Sleeves

Table 5 shows the maximum values of tension, stretch and collision pressure for 13 pairs of front and back panels with varying ease starting from 0.0 cm to 12 cm at the bust area at an interval of 1 cm for the sleeve-less blouse. With no ease at the bust area, the blouse is constrained at the bust area and for the properties of the 35/65 Cotton-Polyester blended fabric considered in this study, the maximum tension found on the blouse was 61.86 gf/cm (see Table 4 and Figures 10 and 11). The maximum tension was found to be concentrated at the sides of the bust area underneath the armholes, as it can be seen in figure 9, and the tension in fabric acts mainly in the weft direction. As the pattern pieces started to include ease at the bust area, the maximum tension also started to fall down. Up to 2cm ease, a drastic reduction of tension was seen for an increase of every cm of ease. When the ease was between 2 cm and 7 cm, a gradual decrease in tension over the virtual fabric took place as can be seen in Figure 10 and 11 and in Table 5. However, when the ease was between 8 cm and 12cm, the maximum tension in virtual fabric did not vary significantly, as it can be seen in Figure 10 and Table 4.

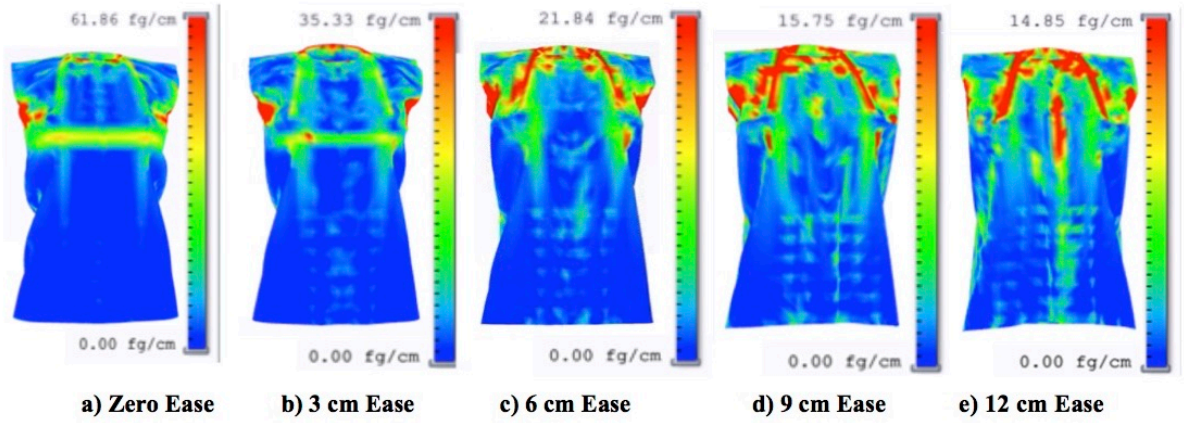


Figure 10. Tension Maps on the Virtual Sleeveless Blouse with varying ease at Bust area

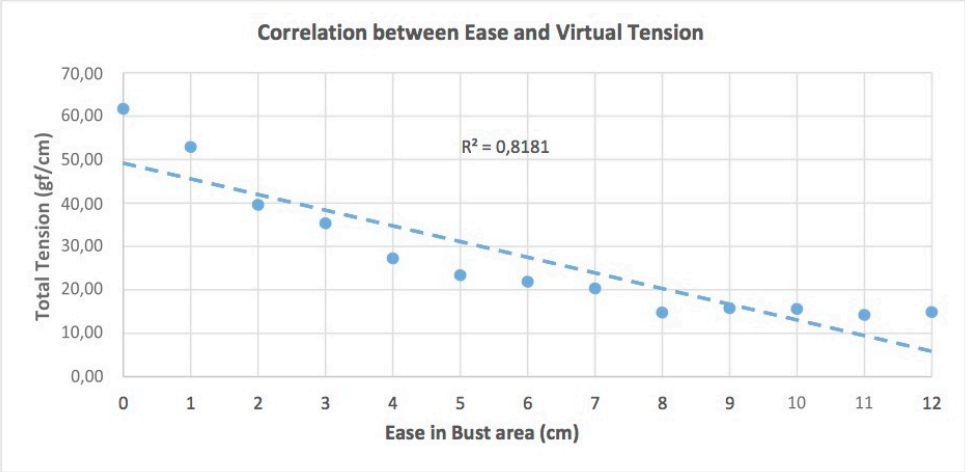


Figure 11. Correlation between Ease in Pattern and Tension in Virtual Fabric of the Sleeveless Blouse

In stark to virtual tension, the stretch in virtual fabric was found to be working in the middle of the bust zone and maximum stretch was found as 2.68% when there was no ease in the bust area of the virtual blouse. As the ease began to increase, the value of maximum stretch began to decrease and started to spread towards the upper chest area (see Figure 12). It is evident from the Figure 12 that stretch in the virtual fabric is mostly active in the weft direction. Similar to the phenomenon of tension distribution described earlier, the maximum stretch in virtual fabric also experienced a drastic reduction with the increase of ease up to 3 cm as it is evident in Figure 13 and Table 4. When the ease was increased gradually from 3 cm to 8 cm, a gradual decrease in the stretch in the virtual fabric took place as it can be seen in Figure 13 and in Table 5. However, when the ease at chest was between 9 cm and 12 cm, the maximum stretch in virtual fabric did not vary significantly, which can be seen in the Figures 12, 13 and Table 5.

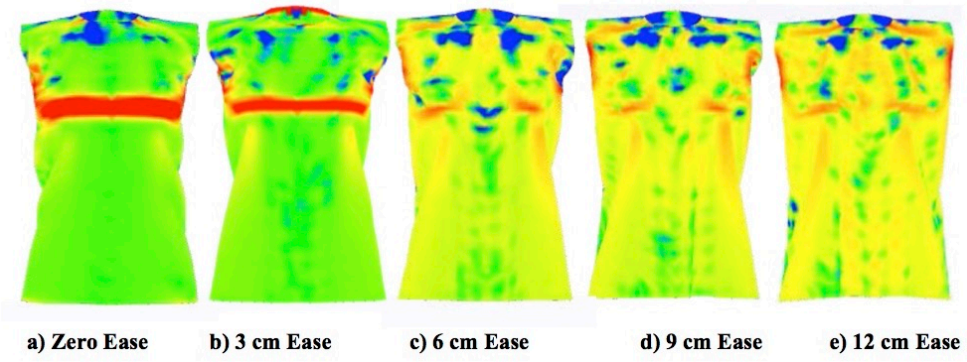


Figure 12. Stretch Maps on the Virtual Sleeveless Blouse with varying ease at Bust area

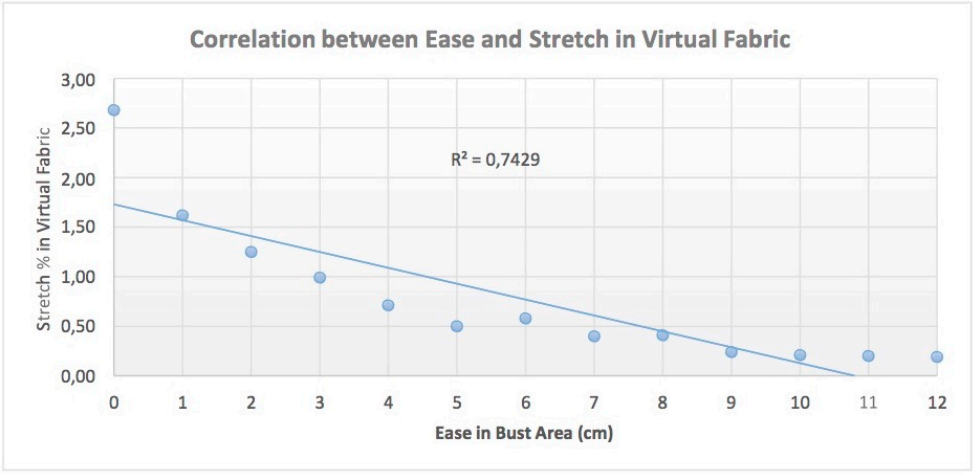


Figure 13. Correlation between Ease in Pattern and Stretch in Virtual Fabric of Sleeveless Blouse

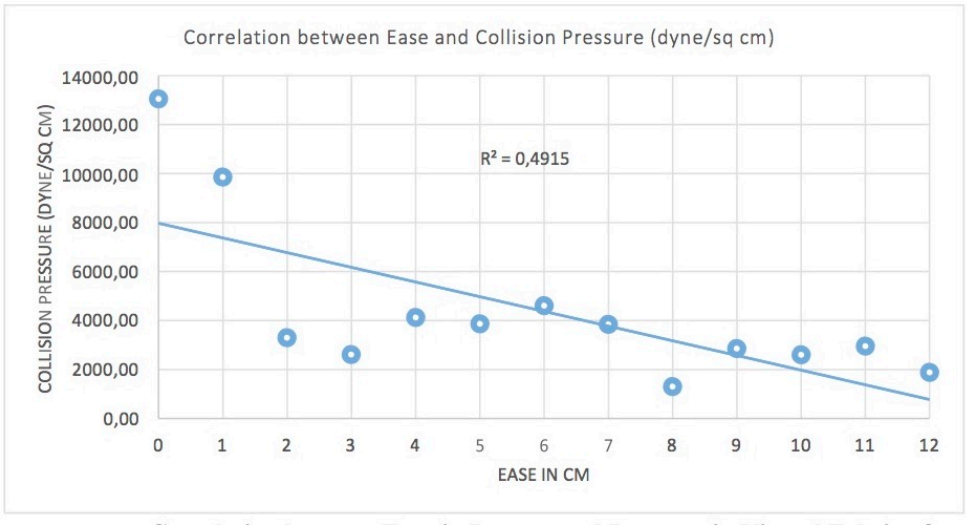


Figure 14. Correlation between Ease in Pattern and Pressure in Virtual Fabric of Sleeveless Blouse

The analysis of the collision pressure (dyne/cm2) at the contact point of virtual fabric and skin of the virtual mannequin indicates that the correlation between ease and pressure is not very significant (see Figure 14).

Table 5: Virtual Drape Parameters with varying Eases at the bust zone in

Ease at bust area	Total Tension (gf/cm)	Total Stretch %	Normal Collision Pressure (dyne/sq. cm)
0	61.86	2.68	13051.80
1	52.90	1.62	9852.91
2	39.57	1.25	3303.29
3	35.33	0.99	2611.66
4	27.27	0.71	4125.87
5	23.35	0.50	3868.93
6	21.84	0.58	4603.03
7	20.30	0.40	3850.30
8	14.74	0.41	1309.26
9	15.75	0.24	2859.35
10	15.57	0.21	2598.27
11	14.22	0.20	2960.28
12	14.85	0.19	1888.80

It is clear from the above-mentioned findings that any change in the bust ease from zero to 2cm in women's blouse influenced the mechanical behaviour of virtual drape significantly and any change in ease between 8 cm and 12 cm does not affect the mechanical behaviour of virtual drape in any notable way. The correlations between change in ease and drape parameters (p values 0.0000217 and 0.00015 for tension and stretch respectively) are statistically significant.

Virtual Blouse with Sleeves

For the full-sleeve virtual blouse, the tension and stretch followed a similar pattern seen in the case of the sleeveless blouse. Table 6 shows the maximum values of the virtual drape parameters of the full-sleeve virtual blouse made of pattern pieces with varying eases at the bust area. When there was no ease at the bust area, the maximum tension working in the virtual fabric at the bust girth zone was found as 113.72 gf/cm, which is found to be active at the sides of the body and biceps area of the sleeves. Figure 17 indicates that the maximum tension at the bust zone begins to decreases with the increase of ease in the pattern pieces. A rapid decline of tension up to a 2cm increase in ease, a gradual decrease between 3cm and 7cm of eases and no significant change when ease is increased beyond 8cm was observed. The nearly similar trend can be seen in Figure 18 that shows the correlation between ease in pattern and stretch (%) of virtual fabric. As it can be seen in figure 16 that maximum fabric stretch took place mainly at the back and biceps area. Similar to the sleeveless blouse, collision pressure in full-sleeve blouse follows a decreasing trend with an increase in ease but the correlation is not very predictable. The correlations between change in ease and drape parameters (p values 0.0000017 and 0.000018 for tension and stretch respectively) are statistically significant.

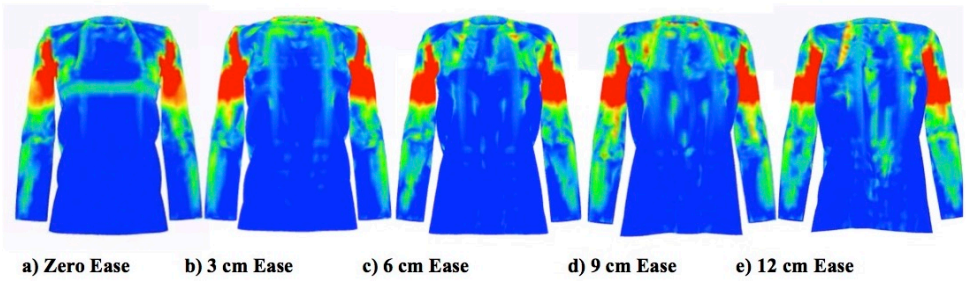


Figure 15. Tension Maps on the Virtual Full-sleeve Blouse with varying ease at Bust area

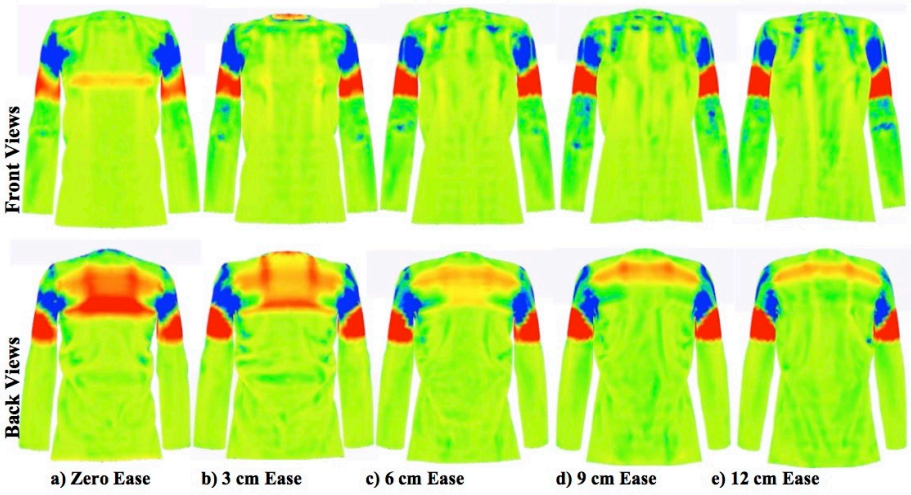


Figure 16. Stretch Maps on the Virtual Fullsleeve Blouse with varying ease at Bust area

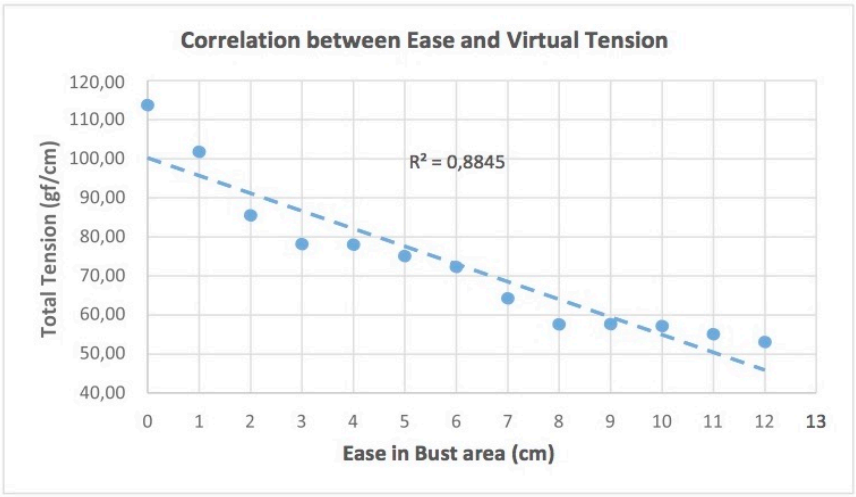


Figure 17. Correlation between Ease in Pattern and Tension in Virtual Fabric of the Full-Sleeve Blouse

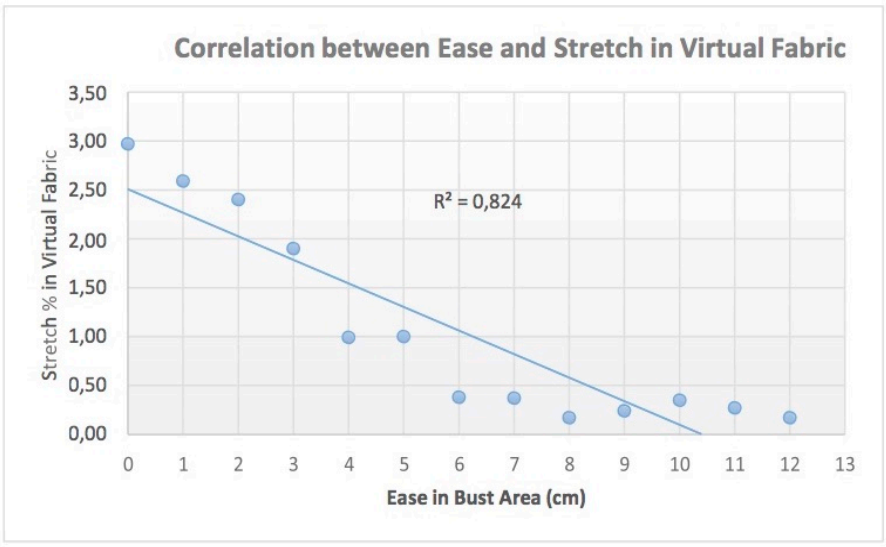


Figure 18. Correlation between Ease in Pattern and Stretch in Virtual Fabric of the Full- Sleeve Blouse

Table 6: Virtual Drape Parameters with varying Eases at the bust zone in Simulated Full-Sleeve Blouse.

Ease	Total Tension (gf/cm)	Total Stretch %	Normal Collision Pressure (dyne/ sq. cm)
0	113.72	2.97	42810.36
1	101.82	2.59	13789.68
2	85.54	2.40	11111.82
3	78.17	1.90	10170.11
4	78.07	0.99	10906.49
5	75.13	1.00	10304.08
6	72.37	0.38	10100.48
7	64.29	0.37	9986.43
8	57.63	0.17	8342.89
9	57.67	0.24	8992.23
10	57.18	0.35	8502.05
11	55.11	0.27	8279.28
12	53.12	0.17	8160.29

Discussion

Results presented in section 3.1 and 3.2 indicate that two virtual drape parameters (tension and stretch) are significantly correlated with the change in ease in pattern pieces. The values of these parameters can be used to predict the required level of ease to achieve a required level of fit of the garment. Sayem (2016) reported similar findings after experimenting with virtual men's shirts. Ease is an important factor of clothing fit and this can be either functional or design related. The correlation between ease in pattern pieces and virtual drape parameters can be utilised to predict the required level ease to achieve a good fit. If the fabric-specific values of virtual drape parameters of pattern pieces representing an accepted "good fit" for a certain style can be stored in a database, it will then help to predict the fit quality of any newly designed pattern

sets of a similar style. This leads to the concept of a 'virtual fit prediction system' similar to the 'colour matching system (CMS)' used in the textile colouration industry (see figure 20). A CMS can predict the dyeing recipe for an unknown colour or can decide the "pass/fail" result of a dyed sample comparing with a standard. To be able to predict the recipe of any given colour, the system should have a built-in library of colour values (the spectral values following a colour theory, for example, CIE Lab theory, read by a spectrophotometer) and the corresponding dyeing recipes (list and quantity of dyestuff and associated chemicals). Employing the computational logic, a CMS can suggest the appropriate recipe for an unknown colour by matching its spectral values with the stored information in its database. It also can make a decision on a newly produced sample by comparing spectral values with the values of a colour standard pre-stored in its database. Similarly, by having a pre-built database of fabric- specific virtual drape parameters of differently designed pattern pieces will guide to proper selection and prediction of required ease and judgment of the fit quality of virtual clothing. It is expected that such an objective approach to fit analysis together with the traditional visual analysis will help fit technicians to take a decision on the 'acceptance or rejection' of any newly developed pattern sets without seeing the physical prototype, and this may lead to manufacturing garment with zero physical prototyping.

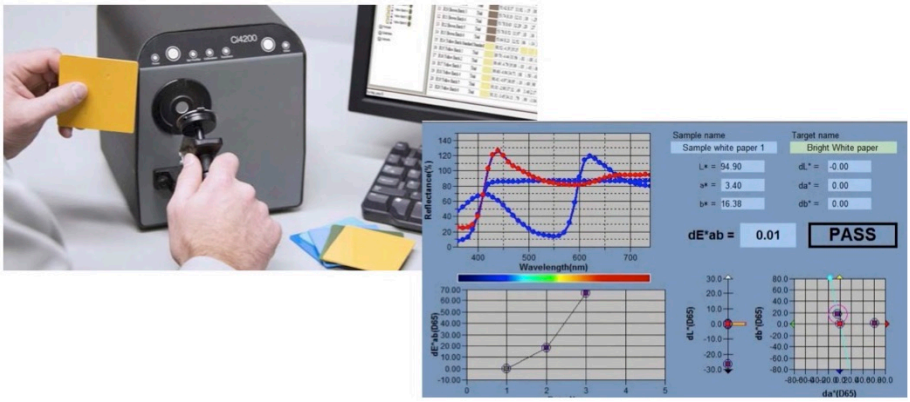


Figure 20. Spectrophotometric Colour-Matching System used in Textile Industry

Conclusion

There has been no standard protocol or guideline of virtual fit evaluation available; therefore, the tools for virtual fashion prototyping are yet to find any notable application within the industry, especially at the manufacturer's end. Several researchers (Kim, 2009; Lim, 2009 and Kim and LaBat, 2013) reported that only visual analysis did not provide enough clues for effective decision-making on the acceptance or rejection of a virtual prototype, or on altering pattern pieces to achieve expected fit in the virtual and ultimately in the physical garments. This research presented an objective approach to analyse the virtual drape of ladies blouses using virtual drape parameters. Findings show that the virtual drape behaviour of fabric can be numerically measured and the values of virtual tension and stretch correlate with the change of ease in the 2D pattern pieces. This will help the designers and technicians to predict the required level of change in ease and design in the 2D pattern pieces to achieve the desired drape and fit of the virtual garment. This also leads to the concept of an intelligent "virtual fit prediction system" principally similar to the colour matching system currently in use in the textile industry.

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The Sustainable Handloom with Specific Identity "a Study on the Traditional Textiles of India"

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KEYWORDS

Indian Handloom, Traditional textiles, Challenging issues, Design interventions, Marketing Mix

ABSTRACT

Indian handloom sector of the textile industry is existing from time immemorial and has served the economy substantially well in terms of employment. It is the largest sector of Indian economy after agriculture. Handloom is unparalleled in its flexibility and versatility, permitting experimentation and encouraging innovations. The strength of handloom lies in its specific innovative designs, which cannot be replicated by the Power loom sector. Thus, handloom forms an inseparable part of the Indian culture and heritage and contributes to the richness and diversity of the artistry and craftsmanship of the weavers.

However, after the introduction of Power loom and Mill culture the use of handlooms in Apparel, Textile and Fashion field has reduced drastically in India and abroad. Although, now there is a noticeable progress in this sector but the scenario is not very pleasing and the industry is facing many challenges due to lack of exposure, awareness and knowledge of changing technologies, methods and the requirements related to raw material, processing, design and marketing etc. The weavers and craftsmen are not happy and facing a series of problems, this has led to closure of many handloom units and thus has resulted in massive unemployment.

Hence a need was felt to reintroduce handloom practice to spread awareness among people and to preserve the significant dying crafts. The purpose of the study was to explore the current scenario of handloom sector in Andhra Pradesh & Telangana state of south India so as to propose the solution of the identified problems, to document the process & to suggest the suitable design & marketing approaches. The present study was conducted in two steps vis a vis field study and an interview/survey. The finding of the study helped to understand the present scenario and to recommend the necessary steps accordingly.

Introduction

Indian handloom fabrics date back to the Indus Valley civilization. The art of hand spinning and hand weaving of cotton was known to the Harrappans nearly five thousand years ago. ***Evidences of handloom practiced in India are also found in epics like Ramayana and Mahabharata that reveal at length about the craft*** **(**B.B. Paul,fiber2fashion.com, 2016)**.**The fineness of our historical handlooms was such that the poets of the Mughal durbar equated our muslins to baft hawa (woven air), abe rawan (running water) and shabnam (morning dew) (www.india-crafts.com, 2016).

Each region of India has a specific type of handloom engaged in producing distinct varieties of fabrics. The style depends upon the location of the place, climatic conditions, cultural influences and trade contacts. The tropical lands of Andhra Pradesh, Telangana, Kerala, Karnataka and Tamil Nadu have their unique cul-

tural traits. The enriched silk, cotton and zari weaves of Andhra and Telangana are unmatched to the cultural fabric of other parts of India (Megha, Mehrotra, 2015). There is a huge contribution of the handlooms of these states to the handloom sector. However, after the introduction of power loom and mill culture the use of these handloom textiles has been reduced drastically in India and abroad. Although, now there is a noticeable progress in this sector but the scenario is not very pleasing and the industry is facing many challenges. The weavers and craftsmen are not happy and facing many problems which has resulted into closure of many handloom units leaving a large section of society unemployed. Hence a need was felt to revive the handloom industry from the verge of extinction and to spread the awareness among people to preserve the significant dying art .The main objectives of the study are:

- To study and appreciate the aesthetics of traditional hand woven textiles of Andhra Pradesh and Telangana States of South India, *with respect to the specific handloom identity, unique style of weave pattern, prevailing motifs, color trends etc.*
- To document the procees of development of these traditional textiles.
- To explore the current scenario of handloom sector of India *especially* from Andhra Pradesh & Telangana state of south India so as to propose the solution of the identified problems & to suggest the suitable design & marketing approaches.

Literature review

Handloom is an apparatus on which weavers create fabric by interlacing the warp and weft threads manually. The strength of handloom lies in introducing innovative designs, which cannot be replicated by the Power loom sector. As per Handloom Census 2009-10, there are 77 lakh handlooms in India, which constitute almost 80% of world handlooms and provide employment to 43.31 lakh people directly (handlooms.nic.in, 30th December, 2015).

Though we come across a wide range of handlooms across the country but the weaves from Andhra and Telangana are unmatched, unparalleled and leave a long lasting impression. The rich and luminous coloured intricate silk, cotton and zari work is the main forte of these two states.

Across Andhra Pradesh and Telangana

Ikat textiles of Telangana: Telia rumal and Pochampalli Ikat

The term 'ikat' is derived from the Malay-Indonesian word 'mangikat' that means to bind or knot. It is a resist tie & dye technique of yarns according to a predefined pattern and then woven to create clear design on fabric The two types of ikat are: **Single ikat** (warp ikat and weft ikat) as the name suggests, in warp ikat, the warp yarns are tie-dyed and woven with solid coloured weft yarns and similarly in weft ikat, the weft yarns are tie-dyed and woven with plain warp yarns. **Double ikat**: In double ikat, both warp and weft yarns are tie-dyed and then woven to create clear designs on fabric (NIFT. Dr. Sudha Dhingra, Ruby Kashyap Sood, et al., 2014).The earliest reference to ikat can be found in the Ajanta cave paintings of the 6th century AD.

This is the ancient art practised by ancestors of the region. Traditionally the technique was used to produce Telia rumal (handkerchief) in Chirala village of Telangana. As til oil (til tel) is a special ingredient used in the production of rumal, the textile is known as telai rumal.Traditionally, the commonly used colours for the telia rumal were terracotta red and black, using natural dyes. The layout of a typical telia rumal comprised of a geometrical grid- like pattern with borders all around, thereby creating small squares at the four corners. Over the centuries some contemporary motifs like flowers, birds, animals, stars, clock gramophone and aeroplane were also used (Dr. Sudha Dhingra, Ruby Kashyap Sood, et al., 2014).

In the early 20th century, these double ikat rumals were exported to gulf countries during the Nizam rule. However by the mid of 2oth century, the demand for telia rumals reduced and the technique was adopted by weavers of Padmasali communities of Pochampally, a village near Hyderabad to produce lucrative products

like saris, dupattas, dress material and yardage for apparel and home products. With the gradual development of the Pochampalli ikats, the art of weaving spread to many other villages like Siripuram, Koyalagudam, Puttapakka, Chautupal and Elanki.At present there are at least 40 villages weaving ikat textiles near Hyderabad. Telangana (earlier Andhra Pradesh) is the largest exporter of ikat fabric in India (www.fibertofashion.com, 2016).

Figure-1: Telia Rumal Source: http://www.cohands.in/handmadepages/book282.asp?t1=282

Figure-2: A weaver weaving singal ikat saree at Pochampalli park

Figure-3: Tied and dyed yarns post woven in to a saree

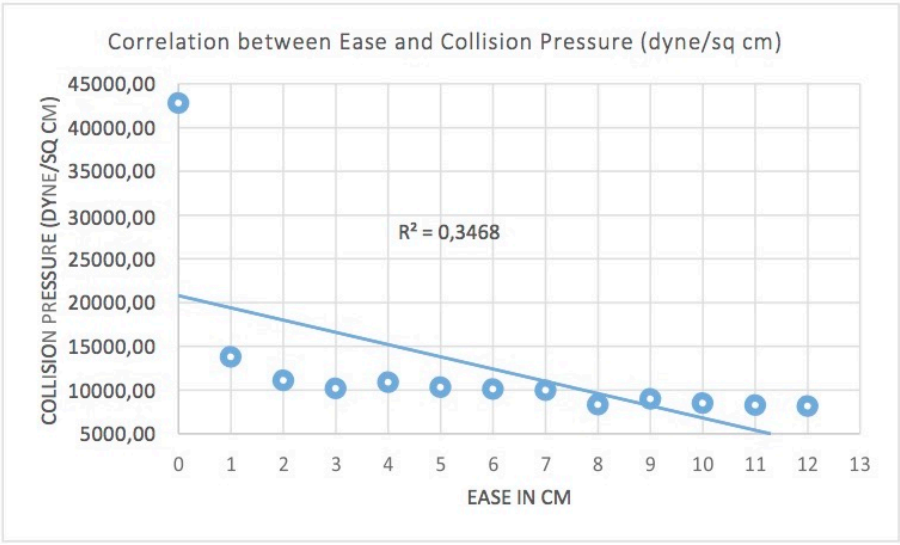

Figure 19. Correlation between Ease in Pattern and Collision Pressure in Virtual Fabric of the Full-Sleeve Blouse

The Pochampalli ikat design patterns are more geometric in nature with a variety of bright colours including hot pink, parrot green, bright golden yellow, orange, off-white, royal blue, black etc. Although the designs and motifs have been contemporized over the years, ancient motifs inspired from telia rumal are also still practised. At present single ikat (80%) is practised more than the double ikat (20%) in and around the village as it is bulk friendly. One of the matchless supports of government to the handloom silk weavers of this region towards sustaining their age old art was to establish the" Pochampally Handloom park" in the year 2008.

Pochampalli Handloom ParkSpread over huge area, the park can accommodate 2,000 looms. It provides employment to the weavers in the nearby villages.It has all the facilities for tie and dye process, preparation of warp beam, designing and weaving mechanically on looms at one place. It also ensures the development of high end quality fabrics along with the flexibility for product diversification, bulk production and timely delivery of products. Here training is also given to the people who are not traditionally from a weaver family, in dyeing and ikat weaving (www.fibertofashion.com, 2016).

Gadwal Sarees

Gadwal sarees are handcrafted woven sari from Gadwal, Telengana. They are traditionally woven in the interlocked-weft weaving technique called kupadam locally and often with kumbam in the borders and thus they are also known as kumbam sarees locally. Gadwal sarees are most notable for its lightweight and admirable zari patterns with well-crafted Kuttu borders (silk border) and pallus (www.weavesmart.com, 2016).

These sari features a fine cotton field which is weaved separately and later interlocked with borders and pallu made out of pure mulberry silk (www.weavesmart.com, 2016). Since the sari consists of cotton body with silk pallu, it is also given a new name as Sico saris. It was imparted GI status in 2009 (https://en.wikipedia.org, 2016).

Figure -4: Grey and maroon Gadwall saree (Source: http:// shop.apcofabrics.com/products/pure-gadwal-sico-sarees1510)

Mangalgiri Sarees and Fabrics

Mangalgiri sarees and suit materials are a popular handloom product from the state of Andhra Pradesh. The town of Mangalgiri is not only famous for its beautiful sarees but also well- known for temples; therefore these textiles are also used by devotees for devotional purposes.

These handlooms are known for unique cotton body, which either has stripes or checks on it, with gold or copper zari used on borders. The intricate tribal motifs with vibrant colours background make this textile look elegant and gorgeous. Since these fabrics only have a zari border and zari on the pallu (in case of sari) without any woven designs on the main body, therefore the fabric is woven only on pit looms. This enables the weaver to apply much more force during the weaving process without any gaps. This distinguishes the Mangalgiri textiles from other weaves.The uniqueness of Mangalgiri cotton is due to its durability. The golden thread or zari work demands that the sarees be dry cleaned. However, they can also be hand washed the second time onwards in cold water (www.utsavpedia.-com,2016).

Figure -5: Mangalgiri olive green and maroon cotton sari with zari border (Source: http:// indianfashion-saris.blogspot.in/2015/03/mangalagiri-handlooms-exclusive-sarees.html)

It was registered as one of the handicraft in the geographical indication from Andhra Pradesh by *Geographical Indications of Goods (Registration and Protection) Act, 1999.*At present, handloom weaving is the prime occupation of Mangalgiri town and around half of the population depends on this cottage industry for their living (www.utsavpedia.com, wikipedia.org, 2016).

Uppada Silk Sarees

Uppada silk sarees also known as **Uppada Pattu (Silk in Telugu)** are woven by a special age old Jamdani technique in Uppada in East Godavari district of the state. The term Jamdani is a Persian terminology, in which Jam means flower and Dani means Vase. Jamdani style of weaving was first originated in Bangladesh.

Later, the technique was introduced in Uppada in 18th century where it incorporated designs which were closely identified with Andhra Pradesh (ustavpedia.com,2016).

Upadda sarees are generally made with cotton warp on handloom. It takes around 15-60 days time (if at least 2-3 weavers spend 8-10 hrs per day) to create a magnificent saree. The unique designs of these sarees are created by using pure zari with silk. The geometric and nature inspired motifs like *Kamal or Lotus flower,Asawalli (flowering vines), Bangadi Mor (peacock in bangle),Tota-Maina (parrot and maina),Humarparinda (peasant bird)* are primarily used (ustavpedia.com and www.shatika.co.in , 2016).

The process involved are laying out of design, interweaving silk threads, looming, etc. There are around 3000 looms producing Jamdani sarees in and around Uppada village. Around forty percent of the local weavers are women. It was registered as one of the geographical indication from Andhra Pradesh by *Geographical Indications of Goods (Registration and Protection) Act, 1999* (wikipedia.org,2016).

Figure -6: Mangalgiri navy blue and maroon cotton suit material (Source: http://shop.apcofabrics.com/products/navy-blue-and-maroon-handloom-mangalagiri-cotton- punjabi-suit)

Figure -7: A multicolour Uppada pure silk sari (Source: http://www.handcraftvilla.in/uppada- sarees.htm)

Figure -8: A women in hot pink and green color Uppada sari (Source:http://kaushicollection.blogspot.in/2013/12/uppada-pattusilk-sarees.html

Venkatgiri Sarees

The finely woven Venkatgiri sarees are produced by incorporating the Jamdani technique in Venkatgiri town in the state of Andhra Pradesh. The weavers involved in the craft accounts to 30% of the population of the town. There are around 10,000 looms in this small village.

Historically in 18th century weavers used to weave these sarees only for the royal families and were paid very handsome amounts that it would last them a year or so till the next order was placed. More recently, these sarees got widespread publicity by importing the Jamdani design from Bangladesh. The four weavers who brought this unique technique to India have also been awarded by the President of India.

The exclusiveness of a Venkatagiri saree lies in its pallu designed with big Jamdani motif like: peacock, parrot, swan, mango, leaf etc. More popularily known as Venkatagiri Zari Cotton Handloom Sarees are also now available in silk cotton and pure silk. So it is advisable to wash them gently with soft hands or else you

may opt for dry clean as well. This hand woven sari is considered as one of the softest and most durable saree found in India and suitable for all climates. Mainly Venkatagiri looms manufacture sarees, but now as per demand dress materials are also weaved (www.handlooms.com,2016).

In village dyeing and weaving methods are being constantly updated. With the recently set-up dyeing units in the small town, the weavers of Venkatagiri no longer need to go to the nearby cities or towns to get their produce dyed, thereby saving them a lot of time and money. But unfortunately due to the low wages the traditional weavers are opting out of this industry.

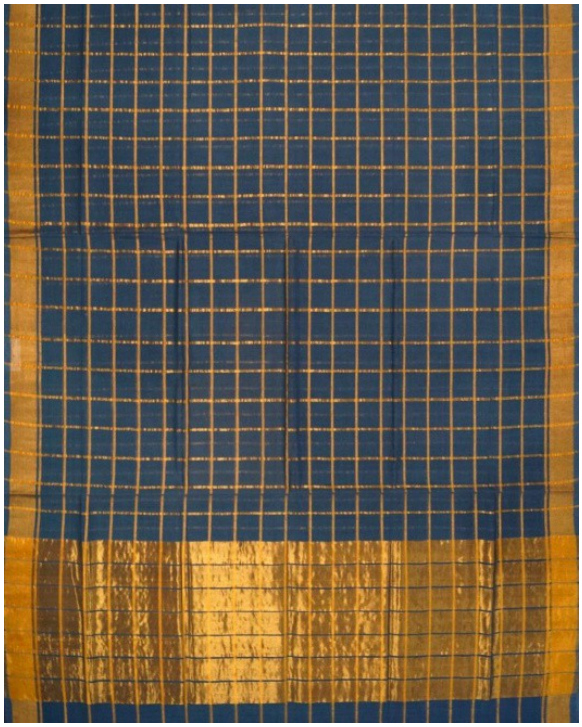

Figure -9: Venkatgiri slate grey and golden cotton sari (Source:http://shop.apcofabrics.com/products/slate-grey-and-golden-pallu-handloom-venkatagiri-cotton-saree)

Figure -10: A traditional Dharmavaram wedding saree in yellow and maroon combination (Source:http://www.indiamart.com/proddetail/dharmavaram-silk-sarees-6859801997.html)

Dharmavaram Sarees

The Dharmavaram handloom pattu sarees are woven in Dharmavaram town of Anantapur district situated in the region of Rayalaseema, Andhra Pradesh. These world famous sarees are even exported to various countries including France and Germany. It was registered as one of the geographical indication from Andhra Pradesh by *Geographical Indications of Goods (Registration and Protection) Act, 1999* (wikipedia.org and www.shatika.co.in, 2016).

Usually these exclusive design sarees have broad solid borders with heavy pallus, adorned by brocaded gold patterns and motifs which resemble the religious symbols depicted in temples and other religious places of worship. It comes in variety of colours mainly yellow and maroon combination which are mostly preferred for marriages. These are also used by dancers of Bharath Natyam and Kuchipudi. The price of this sari ranges from Rs. 2000 to 1 lakh depending on its design and workmanship.Besides mulberry silk, you can find sarees in different materials, like cotton, tussar silk, cotton silk, etc. The variety of handlooms could range from cushion covers to bedsheets, curtains to carpets and various other things (wikipedia.org and www.shatika.co.in, 2016).

Dharmavaram silk weaving industry started off with a few numbers in counting, but today there are over 1500 Dharmavaram silk manufacturing openings with one lakh handlooms in hand (www.shatika.-co.in).

Apart from the above mentioned hand produced textile many other minor handloom crafts like: *Madhavaram Sari, Guntur sari, Siddipet sari, Narayanpet Sari ,Kottakota etc.* are practised in and around the states of Andhra Pradesh and Telangana .All these handlooms are not only the biggest source of employment and income generation next to agriculture, but also admit the skill, creativity and expertise where India is not just at par with, but unique in the rest of the world.

Although the demand for hand woven eco-friendly fabrics are on rise due to today's Nature- Sensitive global consumer and emergence of new markets & buyers, every year in India, some traditional weave or pattern vanish because of the lack of infrastructure and poor planning.

These handlooms are facing many challenges due to lack of exposure, awareness and knowledge of changing technologies & methods, poor quality raw material, out of date loom, old processing techniques, lack of innovation in design and marketing etc. Moreover, there is a phenomenal growth of the number of powerlooms.

On one hand the weavers and craftsmen are fighting against these challenges, while on the other facing a series of problems. They work very hard and do not even earn the stipulated minimum daily wages. Their social status is underestimated in spite of not having any social security, insurance or provident funds. As a result this sector is losing more and more people every year, an estimated 15 to 20 per cent a decade. Although many weavers leave the looms and move to other sector, the contribution of handloom sector to employment and Indian economy is still huge,*e.g., Fabindia, a retail house based in Delhi, consumes 11.2 million metres of handloom fabric a year, or about 10 lakh metres a month at a total value of 112 crore. It generates 100,000 man days of employment and creates over 86,000 jobs, compared to 34 jobs for 24 lakh metres in the mill sector. Many of these jobs are in the rural sector, otherwise deprived of job opportunities* **(**According to an online article "The hand-made in India label" by Laila Tyabji, fibre2-fashion.com, 2016).

These aspects hamper the handloom's domestic and export market. In order to uplift Indian handloom market; these issues are being resolved with the support of state and central government. Since the establishment of Development Commission for Handlooms in the year 1976, there have been several schemes introduced to encourage development of the sector. However, there have been many notable changes in the sector after the separation of two states (Andhra & Teangana) and present government coming into the power.

One of such initiatives of government, the Handloom Reservation Act of 1985 has helped to protect these handloom sari weavers, who otherwise fight to sustain in a competitive environment of power loom (Tyabji Laila, 2016).

The government of India has played an important role in helping the handloom industry find a high place at the international level. The statutory body Handloom Export Promotion Council (HEPC) supports and guides the handloom exporters regarding various trade fairs, exhibitions and buyer-seller meets around the world. The HEPC also markets Indian handloom products at global level in order to ensure that there is awareness among the consumers worldwide regarding the Indian handloom (fibre2fashion.com).The government has also taken another step ahead to promote the handloom products via online shopping websites like flipkart ,snapdeal etc.

On the first National Handloom Day, 7th August 2015, Prime Minister Shri Narendra Modi launched the "India Handloom" brand with the aim to strengthen the visibility of handloom products and to support the 'Make in India' campaign. The scheme supports the idea of zero defect (quality) zero effect (eco friendly) to achieve 100% handloom quality product without affecting environment.

The ministry of textiles has instructed to all the state level registered handlooms specialised from their respective areas to come together and sell all Indian handlooms under the Brand India Handloom umbrella to make the Indian handloom sector more nationalized. So that it will be easier and more approachable for any consumer to get all Indian handloom articles at one place irrespective of their location. Such type of store is being initiated at state art gallery Madhapur Hyderabad with the support and encouragement of development commissioner of handloom, ministry of textile.

In a recent development, the union textile ministry brought as many as 14 leading e- commerce entities to increase dissemination of **handloom** products in the domestic market. In order to promote the weavers, easy loans under Mudra scheme have been initiated (Jashnani Rahul, 2016).

A separate section has been created for India **Handloom** brand on the webpage of Office of the Development Commissioner for Handlooms. According to Development Commissioner, this step would assure the consumers receive authentic products as there have been cases of bogus products being sold on many portals (handlooms.nic.in).

The many renowned designer and textile revivalist of the country like *Ritu Kumar, Gaurang Shah, Rahul Mishra , Shravan Kumar Ramaswamy, Bina Rao ,Vinita Pasary ,Chelna Desai* have also played an important role in the revival of these handlooms and to promote & showcase the potential of these crafts at national and international fashion platform. The designers have trained and helped many artisans to enhance their design skills across the various craft cluster areas. The artisans get chance to work under the guidance of designers and develop the high quality unique and contemporary products. The remuneration paid to these artisans is higher as compared to the others. The successful usage of such handlooms has helped the designers to achieve the fame and make the place in fashion industry. Indian celebrities like Kirron Kher, Vidya Balan, Sonam Kapoor,and Rekha have also been supporting handlooms by wearing their products at events and reality shows.

The brands like Fabindia, Good Earth, Anokhi and young brands like Raw Mango, Anavila, Péro and an online brand Jaypore .com are also promoting and encouraging the usage of handloom of India. Recently many other companies and brands like *Allen Solly, BIBA*, *Reliance* and *Arvind Mills* have come forward to start and launch handloom based collections.

An online Campaign, "The 100 Sari Pact" encouraged women to take out their handloom saris from the trunks and start wearing them on a daily basis (Tyabji Laila, 2016).

These were some of the mention of the many initiatives in the country which manifest that handlooms are continuing to be pertinent and in demand, in spite of the fact that this sector is facing many serious problems.

Methodology

The present study was carried out with the key objectives – to study and appreciate the traditional textiles of Andhra & Telangana states of India, to explore the current scenario of handlooms of the said states so as to propose the solution of the identified problems, to document the process & to suggest the suitable design & marketing approaches. The following methods were adopted to achieve the above objectives.

1. Existing literature from various books, magazines and websites has been reviewed and analysed.
2. A visit to Pochampally cluster & Handloom Park was conducted.
3. The director Pochampally Handloom Park Mr. Damodar and the assistant director Weavers Service Centre Mr. Himaj Kumar were interviewed.
4. India's popular Hyderabad based designers *Mr Gaurang Shah, Ms. Bina Rao, Ms. Vinita Passary* and Weaving artist Ms. Suraiya Hassan were interviewed.

Findings & Discussion

Based on my study and interview of the above mentioned eminent persons of this field, it is clear that the there is a bright future for the handloom as its demand is growing day by day. And the most experimenting consumer of today, The Youngsters, also want to see and try handloom. It is also because of the awareness spread through social media and government's role in promoting the handloom.

Also, there's a lot of input from designers who are working with these handlooms. On the other front, platforms like *Lakme Fashion Week and Fashion Design Council of India* are promoting handloom textiles, which are also helping in changing people's mind-set towards handloom.

> *Initially, the customers were like "Why should I spend so much on a simple silk saree? Rather I can buy a nice embroidered saree in the same amount". But now they understand the amount of effort and time put in each piece of handloom. (Gaurang Shah-during personal interview)*

Paradoxically, the sustaining of these crafts seems little difficult as this sector is facing many problems.

The weavers do not want to continue the craft that has been traditionally done from centuries. They want to do or rather copy other textiles, which has better prospects. For example the Gadwal weavers already started weaving Paithni of Maharashtra as the demand of Gadwal craft has been reduced and moreover they are being paid more to weave Paithani by government of Maharashtra. Which is causing the dilution of GI status of the place .The mind-set of weavers has completely changed.

Another issue is that the young generations are looking for the **alternate prospects** for the monetary benefits and better social status. Because of which many crafts are dying these days. The most of the weavers in this sector are over 50 years of age, if they are not consistently looked at, the next generation will not have the knowledge about it. Probably this will be the last generation that will be seeing the handloom. If this continues, in another 20 years Indian handloom might die and there'll be nobody else to do it.

As most of these looms are pit looms, during monsoon the looms are closed due to the rain water getting blocked in the ground. Little drawback of these handloom is also due to its **low productivity** in comparison to powerloom and mill sector, while there is **limited scope of technological upgradation** and improvement in weaving activity. For eg: The Gadwal saree is having the **competition with powerlooms**. In the state of karnataka powerlooms are producing the similar sarees incorporating vertical and horizontal interlocking like Gadwal sarees and flooding the markets.

Also, few people still believe the age old perception of substandard quality of handloom, which does not stand correct in today's scenario. The best quality handlooms have reached the market and being developed by incorporating the best quality expensive materials (yarn, dyes and processing etc.) and more advanced treatment. And the output is the Best Quality Textile as it is woven with the skilled hand of our artisans in villages of India. Pochampally Handloom Park is the first one to register under Indian handloom brand as an initiative to deliver the best quality handloom.

The government organization like APCO, TISCO and Central Cottage Industry etc. are taking the goods through cooperative societies and they only decide the price, which are generally **underpriced**. However the price should be fixed keeping in mind the labour involved, personal requirements & suitable wages for the artisans. The pricing gap has resulted in poor quality products as artisans are not happy and indirectly forced to dilute the quality to meet against the quoted price. This has affected the sale as the products are lying at government offices and are being only sold at discounted rate. Exceptionally Pochampally Handloom Park decides the suitable price in accordance to the need of the artisans. This supports them to maintain the quality product. Before park artisans were getting 3-4 thousand, while they get Rs.10-12 thousand per month now.

There is lot of scope for digital marketing in electronic goods and electrical appliances. But in case of textile, selecting fabric and its products by hand gives more satisfaction. In spite of the fact few brands like like Jaypore .com are still managing online and doing well. Even Pochampally Handloom Park is looking forward to promote and market their products online.

According to Mr. Damodar, these Handloom products are **lacking in terms of design** because of poor design inputs at the cluster level. Across all the handloom clusters the developed designs are outdated in boring colour combinations. The people want to see something new and trendy each time in spite the fact that traditional design always has its value.

The assistant master weavers Mr. Yadagiri Ganji & Mr. Bavana Rushi K, who are working for master weaver Gajam Anjaiya said that the initial designing of these textiles are generally hand done, however more effective designs can be developed by computer.

While on the other hand designer Gaurang Shah felt that initially there was a gap in between market requirement and developed product but over three to four years the gap has been bridging. Upcoming designers and students want to work with weavers, which is helping in bridging the gap. There are designers who are serving to various categories of audience. On one end there are designers who are taking handloom to high end and on the other end there are designers who are working on simple handloom products and putting them forward at a very affordable range.

Apparently, there are only a few designers who are working on handlooms so that it can sustain. Most of the designers are just working for their own benefits. They work with the weavers for one season, make one collection and leave them, which is very wrong. Very few people are serious about handlooms.

In perspective of Surraiya Hasan Ji, more experiments and innovations should be done by the designers and the weavers so that the outcome of the handloom is appealing and different. Also once it is different; it can be supplied abroad where it will stand out from their native textiles and that is how the weavers can earn a little more. Hyderabad based designer Ms. Vinita Passary stated that there was a growing need of handmade products, it was just that how you look at it, how well you price it, how you Re- Invent it .People want something new each time and that's the challenge we have to meet.

According to designer Ms. Bina Rao, founder of brand Creative Bee, one of the most important issues is the **non involvement of the people from the core field** to seek advice for making any new handloom schemes. The government before making any new handloom schemes should take advice from the people, who are closely associated with the clusters like designer, practitioner etc. and not to call the commissioners from different states who are bureaucrats. As they are not well educated about the handloom and will not be able to take the right decision and just be a spectator in the whole committee meeting.

Mr. Himaja Kumar, Assistant Director Weavers Service Centre Telangana, mentioned that the decreasing demand of these handlooms of both the states is also due to the changing clothing patterns, therefore **reduced usage of sari** among the women's of India. Unfortunately all these handlooms of Andhra and Telangana mostly weave saris except Mangalgiri and Pochampally and Dharmavaram clusters. Hence the diversification of the craft has become the need of today. According to him as an approach to revive the handlooms, the Govt. of Telangana has hiked the wages of the artisans to 30%.

In accordance to the study and my discussion with all the above people, it is clear that the ikat craft of Pochampally is in better state compare to the other handlooms of the Andhra Pradesh and Telangana. It is probably because of the two following reasons:

1. Increased demand of ikat in domestic and international market as the brand building of Ikat has increased in magnitude over the past few years after the establishment of Pochampally Handloom Park. As a result the artisans in and around the village has restarted their units that were shut earlier which covers approx 90% of total Pochampally handlooms.

2. This handloom cluster also produce the dress material and fabric yardages used for apparels and home furnishing other than sarees. In domestic market the demand is more for sari and dress material out of which Telangana and Andhra state has better demand for sari than dress material. The domestic market is more compared to export and mostly the ikat fabrics for home furnishing are supplied to abroad (especially Europe & USA).

Although the handlooms of Mangalgiri & Dharmavaram also deals in the running fabrics other than sarees and having better market than the clusters which are just limited to sarees, they are not doing as good as Ikat probably because their brand image lacks publicity as compared to that of Ikat.

Recommendations

The current state of the **handloom** sector demands more growth opportunities. The artisans should have access to infrastructural support, welfare measures and modernized & upgraded technology. They should also be encouraged and be given better exposure and their social status should be uplifted.

Design Interventions:

- Because of the changing clothing pattern in India, the product diversification has become the primary need for many of the handlooms clusters especially those which are limited to produce saris like Upada, Gadwal, Venkatgiri etc.
- There is a good value for the traditional handloom products but we need to launch at least 50% new & more contemporary designs maintaining its traditional essence every year to match up the young consumer's taste & preferences.
- The government along with self entrepreneurs should conduct study to understand the preferences of today's consumers and accordingly for every new season the continuous research and development should be taken with the support of notable Designers of this sector.
- The designers need to look forward to a longer term to work with the weavers. They should put in their learning and creativity along with the weaver's talent to bring out the best and new products.
- The institutes like NIFT and NID should take up some special programmes and workshops to train the artisans in terms of new designs, surfaces exploration and colour combinations as per the current trends & forecast to meet up the need of market.

Marketing Strategies

- It is important to build up the brand image of these handlooms so that the people easily believe in handloom products like many other fashion brands. These handlooms products should be promoted under India Handloom brand.
- Since packaging and showcasing of the products is a salient feature of the branding process, these unique handloom products should have interesting packaging. The use of special ecofriendly packaging material with interesting color story, calligraphy, logo, tagline along with brief history of these unique crafts will help the customer to recognise and connect well with the brand.
- The correct pricing should be done in view of the grassroot level.
- For better publicity self entrepreneurs and state government should come forward and talk more about the significance and speciality of such art & crafts. This can be done through electronic media, social media like Facebook and various other modes of advertisements. More number of exhibitions within the country and abroad can also help in this.
- The marketing experts should be hired to generate the new market avenues every season, every year. We should also reach the customer directly through e-marketing with complete detail and product description.

To retain these crafts we have to keep working around the handlooms so that the weavers are interested and the next generation would want to weave. The handloom day should be celebrated on monthly basis. The organizations and institutes should make it compulsory for their staff and students to wear at least one handloom article on every Friday of the week.

There should be more number of schools and centres which will educate and inform the use of Handloom. The new generation needs to be made aware about it at the school levels. Young students should be taken to the Clusters where the work is on and how every stage is hand done so that they start liking the textiles.The love for textiles should start from childhood so that the children are inclined to their very own art and culture.

Conclusion

The craftsmanship and intricate pattern of the above discussed handloom textiles of Andhra and Telangana showcases the enriched textile heritage of India. As per the study it seems that there is a bright future for Indian handlooms because of its rising demand. However many challenging issues being faced by this sector has become the reason for the closure of multiple handloom units. As a result most of these age old significant crafts have shrunken or are almost on dying stage. Hence the effective implementation of the stated suggestion will primarily help for the better survival of these textiles. Also the ancient art will not be lost in silence and the people involved can have a decent and dignified standard of living.

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Sustainability Communication in Fashion Online Stores and its Impact on Customer Behavior

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ABSTRACT

The aim of this paper is to examine the impact of sustainability communication in the fashion industry on the customers' behavior with a focus on consumers' perception regarding websites with sustainability-specific content. Based on a profound literature review, a projective method in form of two dummy-websites is developed. Both websites illustrate sustainability communication with comprehensive and transparent information demonstrating a credible, trustful and serious commitment. Additionally, both sites have the same structure and an appealing, visualized website design as well as a customer-oriented communication. While each website consists of almost the same aspects such as Vision & Mission, Value chain, Corporate Commitment, Working Conditions, Environment, Social Commitment and documents such as a Sustainability Report and Code of Conduct, they differ enormously in the sustainability-specific content. For instance, website 1 represents a sustainable and responsible company communicating sustainable issues about eco- friendly materials, fair working conditions, ecological production and their social commitment. It further includes eco-friendly wash and care advices as seen by reformation to remember consumers to take care of the environment, e.g. to wash cold or by using ecological detergents. In contrast, website 2 does not represent a sustainable and responsible fashion brand. It also does not communicate sustainable efforts or a sustainable engagement. Rather it is about offering trendy, low-priced fast- fashion products, produced under unfair working conditions with wages and working hours as usual terms in production countries with a focus on style and design. Regarding website 2, all raw materials have been produced conventionally in developing countries and are therefore not eco-friendly, resulting in a pollution of the environment due to long transport routes. Additionally, the website voices the wish to improve the chances for developing animal protection only minimally, showing that the company is not socially committed. Although website 2 focuses on transparency and a customer- oriented communication, it is not sustainable. Both websites are tested via an online survey. A total of 90 fashion students participated in the sample.

The key findings of the survey are that participants in general perceive a website with sustainable content only slightly more positive than a website with non-sustainable content. Therefore it may be argued that the current focus on transparency does not contribute to improve sustainable behavior. This is breaking heavily with the idea that consumers will change their behavior if all information on the supply chain is delivered and communicated. Besides, sustainable participants perceive a website with sustainable content also just slightly more "appealing and persuasive" than non-sustainable participants, while they perceive a website with non-sustainable content slightly less "credible and trustworthy" compared to non-sustainable consumers.

These findings suggest that sustainability-specific content communicated on a website influences the consumers' perception of sustainability only to some extent. The study of this thesis has limitations in that it focused only on the consumers' perception of websites with sustainability-specific content. Further research which goes beyond the idea of transparency is therefore recommended.

Introduction

Sustainability in the fashion industry has been widely discussed in the industry (Strähle, 2017). However, many fashion brands still do not seize the chance to educate their customers about their activities along the value chain by involving them in their communication process (facit research, 2015; NetFederation, 2016). Therefore, it is necessary to provide sufficient information about sustainable approaches to create long-term relationships with customers on an emotional level (Rinaldi

& Semprini, 2015; Wang, 2016). Since the digital revolution and social networks have changed the way as to how fashion brands and customers communicate with each other, a movement with a focus on a direct consumer-and dialogue-oriented communication is indispensable (Rinaldi & Semprini, 2015; Solomon, 2013). The question arises, in how far fashion brands are able to communicate sustainable issues to customers and, in turn, what impact it has on the customers' behavior. It is further questionable what kind of information regarding sustainability consumers are looking for in fashion brands and its products. After the Rana Plaza-disaster, consumers have become more skeptical towards a fashion brand's sustainable practices. As they demand more detailed information provided by companies they need to be educated in order to make better sustainable purchase decisions (facit research, 2015). Therefore, issues such as sustainability and its communication in the fashion business are a topic of major debate in contemporary research.

This paper addresses the specific research objective to investigate sustainability communication in the fashion industry and its impact on customer behavior. In order to gain a profound understanding of sustainability-specific content communicated on a website and its impact on how sustainability is perceived, a survey is conducted in order to compare consumers' perception in general of a website with sustainable content to the consumers' perception of a website with non-sustainable content

The method chosen to give an insight at the beginning of this paper is a literature review providing an overview of the current state of research concerning sustainability as well as regarding the customers' buying behavior process for sustainable fashion. In order to shed light on the research objectives, a projective method in form of two dummy websites was used, which serve as a basis for the survey and visualize sustainability-specific content. An online questionnaire with 90 fashion students at Reutlingen University was conducted which helps to investigate the perception of sustainability- specific content on websites.

Literature Review

Sustainability in the Fashion Business

Sustainable fashion is defined "as fashionable clothes that incorporate fair trade principles with sweatshop-free labour conditions while not harming the environment or workers by using biodegradable and organic cotton" (Joergens, 2006, p.361). Fletcher (2008) complements the definition of sustainable fashion with the aspect of a longer product life cycle while considering a local and ethical production system as well as eco-friendly or recycled materials (Fletcher, 2008). The terms "green fashion" and "ethical fashion" are often being associated with sustainable fashion. While "ethical fashion" means the production under fair labor conditions, "green fashion" in contrast mainly relates to the use of recycled materials and biodegradable fibers (Shen, Richards, Lui, & Feng, 2013).

> *"Both of these dimensions together make the sustainable fashion concept more comprehensive and richer in scope" (Shen et al., 2013, p.135).*

Due to globalization, climate change and increasing environmental problems, facing sustainable issues has become indispensable during the last decades (Jefremow, 2013). These problems also affected the fashion and textile industry since it is the second largest industry polluting the environment after the oil industry (Zady, 2016). The "Rana Plaza"-disaster in a Bangladesh factory, where more than 1.000 workers were killed by the collapse of a building, has strengthened the customers' awareness of social and environmental problems in the fashion industry. This leads to an increased distrust in customers towards companies, caused by transparency and increased access to information through digitalization, which, in turn, shows the relevance of sustainability for fashion businesses (Bhaduri & Ha-Brookshire, 2011; Borromeo, 2013; Williams & Page, 2011).

Communication of Sustainability in the Fashion Business

Due to technological developments consumers have an increased access to online sources such as webpages, social media or mobile apps leading to unending information provided through the internet (Solomon, 2013). Consumers primarily use search engines seeking for information, followed by large shopping platforms with product reviews, e.g. *Amazon* or price comparison sites (Heinemann & Gaiser, 2015). These information platforms help to filter the enormous amount of available information and simplifies the consumers' buying-decision process (Solomon, 2013). This development strongly changed the classical buying-decision process, where consumers firstly select a product at a supplier (point of decision) before purchasing it at the same place (point the sale), as demonstrated below in figure 1.

Since consumers mainly research online for product information before purchasing offline, a shift between the supplier and the product selection occurs. Figure 2 illustrates the new online buying- process, where consumers firstly select a product on the internet for instance through a company's website. Within this step they get an overview of the offered products, compare the provided information in accordance and then select one. In the next step, they choose the supplier, where they finally purchase the product. Thereby the POD does not take place at the POS, but becomes more and more important since consumers decide mostly price-orientated. This is due to extensive information provided on the Internet and other digital media. The new online buying-process shows how simple it is for consumers to switch from one channel to another one during each stage of the buying-decision process. They thereby benefit from a seamless shopping experience whilst being able to select a product uncoupled from offline and online channels (Heinemann & Gaiser, 2015).

Figure 1: The classical Buying-Decision Process Adapted from: (Gehrckens & Boersma, 2013, p. 54)

Figure 2: The new Online Buying-Decision Process Adapted from: (Gehrckens & Boersma, 2013, p.54)

In summary, brands need to consider digital information sources within the second stage of the buying-decision process satisfying the consumers' demand for more detailed information, while relying on web-based technologies at the same time. However, information provided on a corporate website cannot be neglected since it is easier for companies to influence consumers through their website than by word-of-mouth (Strähle & Gräff, 2017; Kivekäs, 2013). As external information such as transparency creates a bond between a company's sustainable effort and their communication of sustainable issues, consumers become aware of sustainability and therefore change their sustainable behavior (Bhaduri & Ha-Brookshire, 2015).

The major tool for communicating the environmental and social engagement is a brands' website. The Swedish fashion brand *Filippa K* focuses strongly on the consumers' involvement within the communication process. In contrast, the majority of fashion retailers do not educate their customers in a holistic way in terms of sustainable fashion consumption via their websites (Strähle, Will & Freise, 2015). As the communication process is based on the sender-receiver model, where the sender represents the fashion retailer and the receiver the consumer (Strähle et al., 2015). The decoded message, which is the sustainability information, is communicated through the company's website to the consumer. By involving the consumer in the communication process (of sustainability), e.g. encouraging sustainable fashion consumption such as recycling or returning used garments in stores, the consumer becomes aware of sustainability. Thereby he responds to the transmitted message and gives feedback in form of sustainable fashion consumption (Strähle et al., 2015). The element of noise can be equalized here with "greenwashing", which means pretending to be sustainable without undertaking any appropriate activities, influencing the consumers' beliefs in a company's credibility (Kotler, Keller & Bliemel, 2007; Strähle et al., 2015). However, there is a lack of consumer-focused sustainability communication by companies, which will subsequently not result in consumer awareness. In this context, *Filippa K* completely involves the consumer by communicating not only social and environmental issues on their website, but also about their core beliefs and motivations for producing long-lasting products as well as sustainable materials while still protecting the environment (Strähle et al., 2015). Further, the brand encourages consumers to actively participate in a sustainable consumption such as the leasing and collection of clothes, as well as giving wash, care and mend advices (Filippa K, 2016). By this, they focus strongly on consumer-related aspects which then builds consumer awareness and finally changes their behavior in general (Strähle et al., 2015). Also *Zady's* online shop features eco-friendly clothing for both men and women with a photo-driven story behind each product. While emotions are often missing in most online shops, the company informs his customers about the whole production process by telling a

story about each item and providing them with high-quality videos. The brand describes itself as a "lifestyle destination for conscious customers" and uses a powerful and simple way to communicate with customers. Due to its narrative style with detailed information throughout their communication channels, customers understand what they are saying and consequently are able to identify with the brand (Moth, 2015).

Some fashion brands make sustainability a priority on their website by putting it at the main navigation, e.g. *H&M,* or attaching a link on their website, which then transfers to the specific sustainability website such as *Gap* (Kuhn, 2014). *Gap* educates all their stakeholders in detail about issues such as human rights, environment, employees, community or sustainability reports (Gap Inc., 2016). *H&M* is a pioneer when it comes to talk about sustainable practices. The brand focuses on people when communicating their sustainability practices by using images of them and microsites on their website telling their story most effectively (Kuhn, 2014). They provide detailed information about working conditions, sustainable materials, garment and conscious collection as well as about their vision, commitment, foundation and business concept (H&M, 2016). Since consumers relate and connect better with people's faces and images than reading exaggerated long text messages they are able to identify better with the brand (Kuhn, 2014). The Belgium fashion brand *Honest by,* which is a pioneer in implementing transparency along the supply chain, offers their customers a detailed price calculation to each product on their website (Honest by, 2016). By this, customers are able to understand what the price is based on and subsequently perceive the products' benefit better (Gould, 2014). Nevertheless, most fashion brands use their websites in order to represent their brand as responsible to perform "good deeds" in terms of people, planet, and profit (Gaskill-Fox, Hyllegard, & Ogle, 2014). However, transparency is still a big challenge which fashion brands have to face, since the supply chains in the fashion industry are highly complex and production processes fragmented into several countries (Niinimäki, 2015b). For this reason, only a few fashion companies are developing solutions for the supply chain. As other fashion brands do not have complete control over their supply chain, they do not communicate sustainable practices on their websites in order to avoid greenwashing (Da Giau et al., 2016).

Therefore, fashion brands need to integrate sustainable practices throughout their core business in order to be perceived a credible and trustworthy by consumers (Da Giau et al., 2016). Further, they need to realize that, through informing customers about sustainable practices, fashion brands are able to influence the consumers' sustainable fashion purchasing decisions resulting in greater sustainability in the fashion industry (Fulton & Lee, 2013). Thereby, sustainability communication as it can be found at *Zady, Honest by* or *Filippa K* websites are good examples to be one step closer towards greater transparency (Morton, 2015).

H&M's existing corporate image e.g. influences the way in how a consumer perceives its web-based sustainability communication (Strähle & Köksal, 2015), especially when the sustainable content is well-structured, visualized and objective. On the other hand, the consumers' perception of their website does not change the corporate image showing that the sustainable content does not really matter as long as a brand has a positive image (Dach & Allmendinger, 2014). However, another survey by facit research in cooperation with the German Serviceplan Group, which annually examines a company's sustainability image score (SIS) with regard to the consumers' perception of the company's sustainable effort, image and reputation, found that *H&M* has been ranked at the end of the score by consumers. This could be based on the fact that the company produces massive amounts of cheap products in low-waged countries, such as Bangladesh or China. However, *H&M* states that they do not exploit workers instead they support women to work in good conditions and commit to pay living wages. Since their customers are willing to pay a higher price for environmentally produced products, the customers' positive perception towards a brand image increases when the brand walks its talk (Elks, 2014). A positive brand image strengthens the customers' loyalty, which usually maintains a product reelection, recommendations to others and/or a cross-selling activity resulting in an overall satisfaction.

Customer loyalty further occurs through an emotional bond, which is strongly influenced by sustainable aspects since consumers have a better feeling when purchasing sustainable products (facit research, 2015). These findings are in line with the study by Strähle & Girwert (2016), where consumers perceive a positive shopping feeling when preferring a product with transparent information. They favor a sustainable product with a similar price and performance against another one, which further shows that a positive sustainability image is essential within the purchase decision. In contrast, a negative sustainability image creates distrust and stands for a bad reputation. However, it is not enough to implement sustainable practices throughout the core business. As a positive sustainability image is based on product experiences and communication, fashion brands have to make sure that their sustainable effort and performance is specially visible and effectively illustrated on their website (Wirtschaftswoche, 2015).

However, empirical evidence that consumers judge (sustainable) content correctly or are capable to interpret the provided information is still missing. Therefor greenwashing may likely occur, as consumers may be easy to mislead. Nor is clear how information about sustainable activities of a company are perceived and interpreted. It is therefor questionable whether consumers seek information for just having a good feeling or whether they really take the quality of sustainability activities as criteria for their buying decision.

Empirical Analysis

Aim of the Study

This study was undertaken in order to find out how consumers perceive sustainability-specific content communicated on a website. The purpose of this survey was to examine the impact of sustainability communication on the consumers' perception based on two websites, which are similar in structure and the way of communication, but differ in sustainability-specific content. Therefor the following hypothesis is tested:

> *(H1) Consumer in general will report a more positive perception of sustainability for a website with sustainable content than consumer who have seen a website with non-sustainable content*

Methodology

The study is descriptive and the results are based on primary data. Participants were a sample of undergraduate and graduate students enrolled in the School of Textiles and Design (TD) at Reutlingen University. An online questionnaire with 90 respondents was conducted receiving an email containing two links to the survey, where they have been asked to choose one of each. The websites showed the communication of sustainable issues though focusing on different content, which will be described later in detail. The respondents' perception of sustainability-specific content through both websites were measured by "1" represented "strongly agree" and "5" represented "strongly disagree". To provide an overview of the sample, descriptive statistics were performed on the demographic variables. An independent t-test was used to test the hypothesis.

A total of 90 respondents participated at this study, whereof 46 belong to the first sample group, that answered questions relating to the website with sustainable-content (website 1). Within in this group, 84.8% were females (N=39) and the majority of the sample was 21 to 25 years old (69.6%, N=32). Respondents, who have seen the website with non-sustainable content (website 2), represent the second sample group with an almost equal sample size of 44 participants, where 86.4% represent females (N=38) and the mean age with 65.9% ranged from 21 to 25 years (N=29), showing that both groups are comparable.

Dummy Websites

By means of the website generator Jimdo, two dummy websites have been created for this study representing a fashion brand called *Evolution*. They form the basis for the following survey, since they give respondents an overview of sustainability communication in the fashion industry where certain questions regarding their perceptions of the websites are based on. Both have the same structure and an appealing, visualized website design as well as a customer-oriented communication. While each website consists of almost the same aspects such as *Vision & Mission*, *Value chain*, *Corporate Commitment*, *Working Conditions*, *Environment*, *Social Commitment* and documents such as a *Sustainability Report* and *Code of Conduct*, they differ enormously in the sustainability-specific content. For instance, website 1 represents a sustainable and responsible company communicating sustainable issues about eco-friendly materials, fair working conditions, ecological production and their social commitment. It further includes eco-friendly wash and care advices as seen by *Reformation* to remember consumers to take care of the environment, e.g. to wash cold or by using ecological detergents. In contrast, website 2 does not represent a sustainable and responsible fashion brand. It also does not communicate sustainable efforts or a sustainable engagement. Rather it is about offering trendy, low-priced fast-fashion products, produced under unfair working conditions with wages and working hours as usual terms in production countries with a focus on style and design. Regarding website 2, all raw materials have been produced conventionally in developing countries and are therefore not eco-friendly, resulting in a pollution of the environment due to long transport routes. Although website 2 focuses on transparency and a customer-oriented communication, it is not sustainable. Both websites included an online shop, where each item, besides product details and information according to the material, is endowed with a transparent pricing.

Results of the Study

In order to investigate the consumers' perception of sustainability for a website with sustainable content compared to a website with non-sustainable content, a one-tailed independent t-test was used. Results showed that:

- the assumption of Levene's F test for equality of variances was violated for the scores of participants perception for "responsible" between website 1 and website 2, $F(88)=7.406$, $p=.008$, $\alpha=.05$ (see table 2 in the Appendix). It can be reported that participants perceive higher degrees of "responsible" for a website with sustainable content ($M=1.8696$, $s=.80578$) than for a website with non-sustainable content ($M=2.5682$, $s=1.10806$) (see table 1), $t(78.348)=-3.408$, $p=.0005$, $\alpha=.05$ (see table 2)
- equal variances were assumed for the scores of participants perception for "sustainable" between website 1 and website 2 considering the Levene`s F test, $F(88)= 2.168$, $p=.145$, $\alpha=.05$ (see table 2). The t-test reveals that participants perceive higher degrees of "sustainable" for a website with sustainable content ($M=1.9130$, $s=.86477$) than for a website with non- sustainable content ($M=2.3409$, $s=1.03302$) (see table 1), $t(88)=-2.134$, $p=.018$, $\alpha=.05$ (see table 2)
- equal variances were assumed for the scores of participants perception for "social" between website 1 and website 2 considering the Levene`s F test, $F(88)=2.972$, $p=.088$, $\alpha=.05$ (see table 2). The t-test reveals that participants perceive higher degrees of "social" for a website with sustainable content ($M=2.0217$, $s=.88164$) than for a website with non-sustainable content ($M=2.4545$, $s=.99894$) (see table 1), $t(88)=-2,182$, $p=.016$, $\alpha=.05$ (see table 2)
- equal variances were assumed for the scores of participants perception for "eco-friendly" between website 1 and website 2 considering the Levene`s F test, $F(88)=1.219$, $p=.273$, $\alpha=.05$ (see table 2). The t-test reveals that participants perceive higher degrees of "eco-friendly" for a website with sustainable content ($M=1.9348$, $s=.90436$) than for a website with non- sustainable content ($M=2.3864$, $s=.94539$) (see table 1), $t(88)=-2.316$, $p=.0115$, $\alpha=.05$ (see table 2)

- the assumption of Levene's *F* test for equality of variances was violated for the scores of participants perception for "ecologically oriented" between website 1 and website 2, $F(88)=14.666$, $p=.000$, $\alpha=.05$ (see table 2). It can be reported that participants perceive higher degrees of "ecologically oriented" for a website with sustainable content ($M=1.5435$, $s=.62206$) than for a website with non-sustainable content ($M=2.3636$, $s=1.14305$) (see table 1), $t(65.770)=-4.201$, $p=.0000$, $\alpha=.05$ (see table 2). The effect size for this analysis ($d=.891223$) was found to exceed Cohen's (1988) convention to a large effect ($d=.80$)
- Regarding "appealing & persuasive", "customer-oriented" and "socially committed" higher degrees of perception could not have been shown for a website with sustainable content compared to a website with non-sustainable content (see table 2)

Mean responses of participants' general perception of sustainability for a website with sustainable content (website 1) and a website with non-sustainable content (website 2) are detailed in table 1.

Table 1: Perceptions regarding Sustainable Aspects between Website 1 &2

	Groups in general	N	Mean	Std. Deviation	Std. Error Mean
Responsible	Website1	46	1,8696	,80578	,11881
	Website2	44	2,5682	1,10806	,16705
Sustainable	Website1	46	1,9130	,86477	,12750
	Website2	44	2,3409	1,03302	,15573
Social	Website1	46	2,0217	,88164	,12999
	Website2	44	2,4545	,99894	,15060
Eco-friendly	Website1	46	1,9348	,90436	,13334
	Website2	44	2,3864	,94539	,14252
Ecologically oriented	Website1	46	1,5435	,62206	,09172
	Website2	44	2,3636	1,14305	,17232
Socially committed	Website1	46	2,2609	,68101	,10041
	Website2	44	2,4773	,95208	,14353

These findings reveal that consumers give a website with sustainable content higher degrees of perception than consumers of a website with non-sustainable content. Participants of the first sample group perceive a website with sustainable content more positively than participants of the second sample group regarding a website with non-sustainable content. This means that consumers in general perceive a website with sustainable content more responsible, sustainable, social as well as eco- friendly and ecologically oriented than a website with non-sustainable content. Thus, the hypothesis of the study (H1) was supported.

Discussion

It could be shown, that consumers in general perceive a website with sustainable content as more responsible, sustainable, social as well as eco-friendly and ecologically oriented than a website with non-sustainable content. However, the difference of the perception between the first sample group and the second sample should usually be much larger in order to be perceived properly regarding the content communicated through the websites. The mean value of the perception for those participants, who had viewed the website with sustainable content normally have to be somewhere between 1 and 2, at least for those aspects

which refer to sustainability such as “social”, “eco-friendly”, “ecologically oriented” and “socially committed”. On the other hand, participants mean values, who have seen the website with non-sustainable content normally have to be somewhere between 4 and 5. Since the effect size based on Cohen's d measures the strength of the mean difference between two groups, the only large effect between the general groups and between the non-sustainable groups can be found for “ecologically oriented. This large effect also refers to the sustainable group as well as for “credible & trustful”, again showing that consumer did not perceive different sustainable contents appropriately. This shows that consumers did not perceive different sustainable contents appropriately.

This is crucial, since it could be argued that the sustainable content of a corporate website does not really matter as long as brands have a positive image. Especially so, when the website is well- structured, visualized and objective combined with sustainability-specific content, these aspects have a positive impact on the consumers’ perception and awareness of sustainability. However, since other findings indicate that consumers do not perceive fashion brands as being transparent and credible, companies have to consider providing sufficient sustainability information on their websites. Referring back to the specific research objective to investigate the sustainability communication in the fashion industry and its impact on customer behavior, with the focus on consumers’ perception regarding websites with sustainability-specific content, a clear answer can be derived. There is a positive influence, because, in general, consumers perceive a website with sustainable content (at least slightly) more positively than a website with non-sustainable content.

Conclusion

The results of the paper reveal that consumers generally have a positive attitude towards sustainability, but also they have a lack of knowledge about sustainable issues and alternative fashion consumption. Since other factors are more important while purchasing fashion such as the price, design or following certain trends, sustainable fashion still remains a niche market. It has been shown that digitization leads to changing behavior in media utilization which represents the consumers’ demand of a strong online presence by companies. As consumers expect detailed information both online and offline, companies have to link their channels to one another and communicate sustainable messages consistently across all communication channels. As findings indicated, there is a shift from the classical buying-decision process towards a new online buying-decision process due to extensive information provided through the internet enabling consumers to switch seamlessly from one channel to another during each stage of the buying-decision process. It has been demonstrated that still many fashion brands do not communicate sustainable practices to customers. It has been further shown that consumers have to be involved in the communication process on corporate websites through providing information about consumer-related sustainable methods to encourage a sustainable fashion behavior. As consumers want to feel an emotionally connection to the products they purchase they expect detailed information. Hence, transparency and credibility are indispensable for a positive brand image and to build brand trust. Since consumers often do not understand the meaning or a message regarding sustainability, provided information needs to be specific and credible as well as communicated in a simple and narrative way. Further, consumers need to be informed on each stage of the buying- decision process through an open dialogue, which helps them to make better sustainable fashion decisions.

Key findings of the conducted online questionnaire are that participants in general perceive a website with sustainable content more positively than a website with non-sustainable content. These findings suggest that, sustainability-specific content communicated on a website influences the consumers’ perception of sustainability at least to some extent and companies can use this in order to create a sustainable image. This is breaking heavily with the idea, that consumers will change their behavior if all information on the supply chain is delivered and communicated. Therefor the focus only on education on sustainable consumptions and transparency is not likely to alter todays consumption behavior alone. It will require other means in order to shift the industry into a sustainable direction.

Finally, it is necessary to mention that this paper has limitations with regard to the fact that the study only focuses on the consumers' perception of sustainability-specific content communicated on a website. Further research in both regards the literature review and the conducted survey is recommended to explore the impact on the consumers' buying behavior through web-based sustainability communication. In order to understand the perception of sustainable and non-sustainable consumers more thoroughly, additional research could also examine other impacts perceived by these target groups. Also, findings of this study are based on group buildings according to participants selected scales for sustainable purchase aspects. Due to the small sample size of 46 participants within the first sample group and 44 participants within the second sample group findings are not generalizable to a larger population. It is also possible that these results could be attributed to the composition of students participating in this study. For instance, students outside the apparel and textiles industry may be less aware of sustainable issues. Also, the perception of the sustainable- specific content communicated on the websites might be rated differently by other respondents. Hence, it is also recommended that this study is expanded to a larger population.

After examining the findings of this paper, it can be concluded that it becomes more and more difficult for companies to remain competitive without considering the integration of several channels and promoting sustainable practices consistently across all channels. It has to be carefully considered what kind of sustainability-specific content is communicated on a corporate website since negative information is shared widely and quickly. For this reason, a company's sustainability message can be only perceived as credible and trustworthy by consumers, if provided information is concrete and long-lasting linked with serious engagement as well as communicated in a comprehensible, simple and user friendly language. Above all, sustainable practices have to be involving and directed at customers through a dialogue-oriented communication and should fit the company's core business and their target group. A well-structured, visualized and objective website with sustainability-specific content can be therefore helpful to ensure greater perceptions and awareness by consumers.

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Appendix

Table 2: Independent Samples t-Test Sustainable Groups between Website 1 & 2

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Credible & Trustful	Equal variances assumed	6,325	,021	-2,009	20	,058	-,96667	,48126	-1,97056	,03722
	Equal variances not assumed			-1,893	12,501	,082	-,96667	,51059	-2,07424	,14090
Appealing & Persuasive	Equal variances assumed	2,472	,132	-1,033	20	,314	-,38333	,37102	-1,15726	,39059
	Equal variances not assumed			-,992	14,646	,338	-,38333	,38661	-1,20912	,44245
Transparent	Equal variances assumed	4,386	,049	,038	20	,970	,01667	,44204	-,90542	,93875
	Equal variances not assumed			,036	14,581	,972	,01667	,46087	-,96812	1,00145
Responsible	Equal variances assumed	3,580	,073	-1,176	20	,253	-,60000	,51023	-1,66432	,46432
	Equal variances not assumed			-1,133	15,198	,275	-,60000	,52934	-1,72698	,52698
Sustainable	Equal variances assumed	2,857	,106	-1,416	20	,172	-,66667	,47067	-1,64846	,31513
	Equal variances not assumed			-1,357	14,422	,196	-,66667	,49134	-1,71760	,38427
Social	Equal variances assumed	2,499	,130	-1,574	20	,131	-,78333	,49765	-1,82141	,25474
	Equal variances not assumed			-1,511	14,704	,152	-,78333	,51833	-1,89006	,32339
Eco-friendly	Equal variances assumed	1,243	,278	-,667	20	,513	-,30000	,45009	-1,23888	,63888
	Equal variances not assumed			-,654	17,464	,521	-,30000	,45848	-1,26535	,66535

How Social Media Marketing Influences Fast Fashion Shopping in the New Era of Value Co-Creation: a Study of Chinese Female Fashion Shoppers

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INTRODUCTION

This paper aims to explore how Chinese consumers engage in social media marketing activities with fast fashion brands on social networking sites, through the theoretical lens of value co-creation. Consumers are increasingly taking on new social roles by interacting and cooperating with brands on social networking sites. Embracing this emerging dynamic of consumer empowerment, firms cannot neglect the valuable opportunity to facilitate interactions with consumers for value co-creation, which provides firms with a basis for developing appropriate marketing strategies. Scholars have made efforts to study consumer participation in the value co-creation process. For example, Etgar (2008) developed a five- stage model of consumer involvement in co-production. Jaakkola et al. (2015) elaborated on the general process of co-creation from the perspective of service firms. Others have explored the activities in which the consumers can co-create value with a firm in an art auction (Baumann & Le Meunier-FitzHugh, 2015); food retailing (Groeger et al., 2016) or new product development processes through online technology (Ramaswamy & Ozacan, 2016). Social media marketing is transforming traditional marketing practices in the fashion industry (Hope, 2016), and China represents the world's biggest consumer market, characterised by digital savvy consumers with a desire for international fashion brands. However, most studies focus on a Western context or on a luxury fashion context.

Since social networks become increasingly popular and social technologies become more mature, such online environments have brought with them distinctive consumer behaviours, and a focus on dialogic co-creation by information sharing, knowledge learning and communication between consumers and firms. Dialogic co-creation refers to consumers sharing information about products or brands via e-WOM (Lee & Koo, 2012). However, there are few investigations of the process for consumers to co-create dialogue regarding fast fashion shopping with brands on social networking platforms in the existing literature, especially in non-Western contexts. BCG (2014) revealed that that fast fashion shopping is becoming more prevalent for young female shoppers in China. However, Chinese fashion shoppers spend less than 0.5% of their online time on the official websites of brands or companies, with 80% of online time accounted for social networks (BCG, 2104) such as Sina Weibo, a popular Chinese networking site. In response to this emerging picture of Chinese fashion consumer preferences, this study aims to illustrate this process by developing a conceptual model that draws on the value co-creation diagram to consider three stages (inputs, process, outcomes) of Chinese consumer participation in dialogic co-creation with international fast fashion brands on the social networking platform Sina Weibo. Netnographic data is analysed in order to achieve the following research outcomes:

1. confirm the operant resources that Chinese consumer employs as inputs to co- create dialogues;
2. categorise the different types of social media marketing activities consumers engage in the dialogic co-creation process; and

3. evaluate consumer benefits from dialogic co-creation engagement with fast fashion brands on Sina Weibo.

The findings of this study will enhance understanding of the process of co-creation in social media marketing and provide a deeper understanding of the digital Chinese fast fashion consumer in these environments.

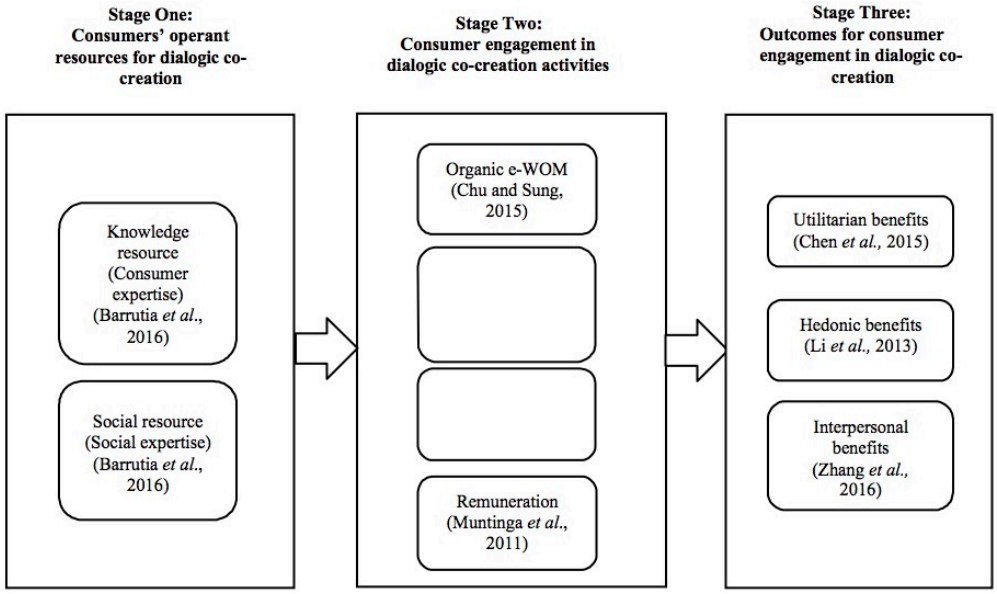

Figure 1: Conceptual research framework

Theoretical background

In order to account for the consumer engagement in dialogic co-creation process, this study adopts value co-creation theory (Vargo and Lusch, 2004) as a theoretical base. Vargo and Lusch (2004) recognised that consumers act as resource integrators in the process of value co-creation. With this point of view, operant resources (skills, knowledge and information) from interactions and communications with consumers are deemed as the inputs in value co- creation. Moreover, a brand's social media platform is an avenue to provide emotional, cognitive and behavioural experiences for consumers to integrate different sets of operant resources in dialogic co-creation (Choi et al., 2016). Consistent with the dialogic co-creation process, one of the important outcomes yielding from brand-customer interactions is that consumers gain multiple benefits (Chen et al., 2015). Therefore, the conceptual research framework in Figure 1 below is based on these three stages:

1. Consumers' operant resources as inputs;
2. Consumers' engagement in the dialogic co-creation process;
3. The outcomes of consumer engagement in dialogic co-creation.

Consumers' operant resources as inputs

According to Barrutia et al., (2016), the major consumer operant resources in an online activity context are knowledge resources, social resources and personality resources (innovativeness). This study focuses on knowledge resources (consumer expertise) and social resources (social expertise) as the main operant resources for consumers in co-creation dialogues with fast fashion brands on social networking sites.

The notion of consumer expertise is defined as the inclusion of consumer knowledge resources that affect directly on consumers' ability to collect, understand and deliver product information (Barrutia et al., 2016).

Compared with ordinary consumers, consumers with expertise are more knowledgeable regarding product category, the analysis ability of product information, elaborating and remembering the product information. Kulmala et al., (2012) noted that fashion shoppers are more likely than other consumers to make comments below the brand's post on social networking sites.

Social operant resources (social expertise) have been shown to constitute key drivers of value creation. Social expertise is deemed as the degree to which consumers receive intelligent social support for co-creation value (Barrutia et al., 2016). In a virtual social environment, the majority of consumers are inclined to participate in a brand's activity by their reference groups. In Doran's (2002) study of consumer behaviour comparison, he found that Chinese consumers showed a preference for allowing reference groups to influence their online engagement behaviour. Given that, social identification may stimulate group-oriented attitudes and behaviours, such as participation in online activities that other members engaged with.

Consumer engagement in dialogic co-creation process

The most important process in value co-creation between consumers and brands is consumers actively participating in brand-related activities (Choi et al., 2016). Nowadays, social networking sites provide new possibilities for consumers to engage in co-creation activities with brands. Social media marketing (SMM) as a two-way communication strategy enables brands to interact with consumers to engage them more broadly, more richly and more quickly. With the phenomena of a dramatic rise in Chinese consumers' engaging in SMM activities, more and more international fast fashion brands have also realized the importance of having a presence on Sina Weibo as part of their marketing strategy to target Chinese shoppers. For instance, global brands such as Zara, H&M have developed social networking marketing communications activities by posting product information or broadcasting fashion news on Sina Weibo. It has been recognized that there are four dominant dimensions of SMM activities (organic e-WOM, amplified e-WOM, entertainment and remuneration) for consumers to participate in dialogic co-creation with fashion brands on social networking sites, thereby leading to effective consumer benefits creation (Park & Kim, 2015).

Organic e-WOM is also called peer-to-peer interaction related to products or services (Chu & Sung, 2015). Personal issues, such as personal style, opinion of fashion trends and the usage of a product are the popular topics in organic e-WOM. Brand-related information, such as new launches, designers and business developments constitute another popular organic discussion. Moreover, giving tips and requesting information of the product also forms a big part of organic e-WOM. Amplified e-WOM from the celebrities is generally viewed by consumers as credible sources of information about the product or firm they endorse (Jin & Phua, 2014). When celebrities mention a brand or product in their tweets, their comments are broadcast simultaneously to potentially millions of followers, ensuring maximum exposure for brand messages. Entertainment plays an important role as shared and consumed content on social networking sites (Dolan et al., 2015). The entertainment activities on SNSs involve a variety of entertaining and enjoyable content, such as online games, cartons, jokes and daily horoscopes. Remunerative activities refer to reasons based on rewards and economic incentives (e.g. prizes, coupons and promotions) that are commonly shared and disseminated through social networking sites (Muntinga et al., 2011). Consumers may engage in brand related activities on social networking sites if they expect to gain some kind of reward, such as economic benefit.

Consumer benefits from dialogic co-creation process

Utilitarian, hedonic and interpersonal benefits are the three dimensions of value that consumers gain from co-creation activities (Chen et al., 2015). In this research context, utilitarian benefits reflect consumers gain valuable collective knowledge or product-related rewards (Chen et al., 2015). Hedonic benefits refer to a source of considerable pleasure from consumers' interactions in the value creation activities (Li et al., 2013). Interpersonal benefits relate to the achievement of social support (Zhang et al., 2016). Consequently, the higher the level of active participation in SMM activities by consumers, the better opportunity they have

to acquire product information, develop relational ties with others, and have a hedonic experience that allows them to enjoy pleasant and relaxed emotions from dialogic co-creation.

Methodology

In order to investigate the process of consumer engagement in dialogic co-creation in this research context, the method of netnography was selected as the most appropriate research approach for scrutinising the inputs, process and outcomes of interaction between brands and consumers within social networks (Kozinets, 2012). Moreover, the existence literatures prove that netnographic data collected from consumers' spontaneous conversations are more natural and reliable to present the real situation of consumer engagement in online activities (Park & Kim, 2015; Skålén et al., 2015).

Specifically, this study focuses on dialogic co-creation between Chinese consumers and the international fast fashion brands on Sina Weibo, as an increasing number of international fast fashion brands and retailers such as Zara, H&M and Topshop have created their own social networking account, posted product advertisements or broadcast fashion information on Sina Weibo (China Business Review, 2014). Moreover, although Sina Weibo constitutes an excellent platform for foreign brands to foster relationship with Chinese customers, negative brand comments can easily be spread, which may harmfully impact on the brand's reputation and influence potential consumer purchase decision-making (Zou & Li, 2016). Managers must understand how consumers respond to negative brand publicity. Last but not least, as the landscape of social media in China is unique, foreign firms must understand how to adapt social media marketing to suit local markets (Sheth, 2011).

Therefore, the following issues will be addressed by conducting netnographic research:

1. to gain a preliminary understanding of consumer interactions with peers and international fast fashion brands on Sina Weibo;
2. to identify the components of consumer operant resources applied in dialogic co-creation;
3. to classify the communication and interaction patterns and topics of SMM activities for consumer to engage in dialogic co-creation;
4. to identify consumer benefits gained from dialogic co-creation engagement.

Research setting and observation

Using purposive sampling as suggested by Kozinets (2012), the subjects for the netnographic study are posts from fast fashion brands' (Uniqlo, Zara and H&M) Sina Weibo and the user- generated comments relating to these posts. These 3 fast fashion brands' Sina Weibo accounts are selected for current study according to two primary reasons: firstly, Sina Weibo has received more scholarly attention as a flexible microblogging medium for brands to apply interactive marketing strategy in recent times (Zhang et al., 2015; Yuan et al., 2016); secondly, these fast fashion brands' Sina Weibo are at the top of fast fashion retailer's microblog ranking, which enjoy a highly active and successful site with respect to engaging consumers in social media marketing activities and achieving marketing purposes on Sina Weibo (Chinese fashion industry, 2014).

Uniqlo, a Japanese-based fast fashion brand, attracted 5,139,232 Followers on its Sina Weibo page, far outstripping other fast fashion brands' Sina Weibo accounts. H&M (896,113 Followers) and Zara (666,395 Followers) ranked in second and third place respectively (see in Table 1). Data were collected from observations of all user-generated Sina Weibo posts for three selected fast fashion brands during three months from 1 September to 27 November 2016.

Table 1: Netnography

Brand	Number of followers	Initial post	Total posts till 1st September 2016	Average number of posts per day
Uniqlo	5,139,232	28 July 2011	10432	6
H&M	896,113	4 April 2011	7344	4
Zara	666,395	27 May 2010	1481	0.65
Source: calculation from observation				

Data analysis

The netnographic data from selected fast fashion brands' Sina Weibo are analysed through a hermeneutical process of interpretation (Kozinets, 2012). The analysis includes the screen captures of textual and graphical posts from the selected fast fashion brands, observed consumer comments below the brand's posts, the reflective field notes from researcher's participation and observation.

Moreover, in order to refine the preliminary "SMM activities" for dialogic co-creation based on literature reviewed, the content analysis will be conducted to conceptualise the topic and sub-theme of posts for each SMM activity. As this study only focus on female consumers, if the posts are related to the information of men's or children's products will be removed.

Furthermore, template analysis will be conducted based on evaluating the content of the qualitative comments and messages that consumers' comment on the fast fashion brand's posts. This approach enabled the identification and understanding of consumers' motivations and reactions in particular of engagement in the SMM activities for dialogic co-creation.

Results

The following discussion based on the netnographic data (360 posts and 36000 comments) specifically explains each of the three stages including the inputs of consumers' operant resources, the process of dialogic co-creation and the outcomes of consumer benefits in turn, with respective quotes extracted from relevant Sina Weibo's posts. The template built from the data analysis is shown in Table 2.

Table 2: Template for consumer engagement in dialogic co-creation process

Stage One: Inputs	Stage Two: Process	Stage Three: Outcomes
Categories for consumers'operant resources employed to co-create dialogues	Categories for SMM activities in dialogic co-creation	Categories for consumer benefits from dialogic co- creation engagement
Knowledge resources (Barrutia & Gilsanz, 2014)	Organic e-WOM (Chu & Sung, 2015)	Utilitarian benefits (Chen et al., 2015)
Social resources (Barrutia et al., 2016)	Amplified e-WOM (Jin & Phua, 2014)	Hedonic benefits (Li et al., 2013)
	Entertainment (Dolan et al., 2015)	Interpersonal benefits (Zhang et al., 2016)
	Remuneration (Muntinga et al.,2011)	

Inputs: Consumers' operant resources for dialogic co-creation

Building on Barrutia et al., (2016), who focus on consumers' operant resources regarding online context, this study shows that the inputs for Chinese consumer engaging in dialogic co-creation with fast fashion brands on Sina Weibo are knowledge resources and social resources. Although Doran (2002) emphasised that Chinese consumers tend to interact with their reference groups such as friends and peers when engaging in social media activities, the netnographic data suggests that knowledge resources rather than social resources are the core operant resources for Chinese consumers employed in dialogic co-creation activities in this context. Specifically, most of the Chinese consumers who engaged in dialogic co-creation activities via e-WOM are more familiar with product categories. For instance:

> *Caipaofan: I hope there are new colour coming for this series of knitwear, as they only got black, white and red previously. But I like pink. (Comment from Uniqlo's Sina Weibo post, 9 November 2016)*

Chinese consumers rely more on their own knowledge and previous experiences to conduct product and brand analysis. Although Chinese consumers usually use their own knowledge resources to express their opinion on Sina Weibo, sometimes they like to interact with their social context, especially their friends and other customers, to gain social support.

Process: Social media marketing activities in dialogic co-creation

The findings in this section confirm that the four main themes (organic e-WOM, amplified e- WOM, entertainment and remuneration) of social media marketing activities that have been recognised in literature reviewed are the primary social media marketing activities as the consumer engagement process in dialogic co-creation with fast fashion brands on Sina Weibo. However, the sub-themes emerged in each topic are slightly different.

Organic e-WOM

The social media marketing activities via organic e-WOM play a crucial part in dialogic co- creation between consumers and fast fashion brands on Sina Weibo. The organic e-WOM contents consist of four main topics, including consumers' opinions' sharing, brand/product- related information, physical/online store information and after sales service. The topic of consumers' opinions' sharing usually got the most attention with thousands of comments. For instance, when Uniqlo invites consumers to vote for their favourite item, consumers are eager to express their ideas.

Fashion brands usually post detailed information of the product including the textual and pictorial information, which attract more consumers to engage in discussion. However, the data shows that the topics of physical/online store information and after sales services got more negative comments than other topics. The consumers are more willing to share their negative experience with other customers. Such discussion will influence the potential shopper's buying-decision making.

Amplified e-WOM

The amplified e-WOM topics are not as varied as the organic e-WOM. The main themes of amplified topics consist of celebrity or model endorsement and designer advertisement. Some of the fashion brands are in a continuous cooperation with a particular celebrity, designer or model. When the fashion brands mention them in multiple posts that concern their new products, regularly received plenty of likes, comments and reposts from consumers. For example, H&M's SinaWeibo post below stated that the most popular couple of celebrities (LiChen and Fanbinbin) will become H&M Chinese endorsers, and it received 34,600 reposts, 10,800 comments and 11,400 likes.

> *Can't wait to share the greatest news in coming 2017 Chinese New Year!! We announce that the model couple @Lichen and @Fanbinbin will be our representors in 2017 new year series. Do you want to know what surprise this couple*

will bring to us? Let's look forward to it!! (H&M's Sina weibo post, 13th November 2016)

Entertainment

The entertainment activities from fast fashion brands on Sina Weibo are a type of post that does not refer to the brand and product information. Instead, the contents of entertainment posts are typically greeting, inspiring slogans, anecdotes, humorous videos etc. These contents provide an opportunity for consumers to divert themselves, aesthetic enjoyment and emotional release. Entertainment posts can increase the level of commenting through reinforcing pleasurable experiences. For instance, one of Uniqlo's posts asked consumers to share their plans for Singles Day and generated 2338 comments.

Remuneration

The major contents of remuneration posts refer to rewards and economic incentives (e.g., discounts and sweepstakes), which appear to be highly influential and exhibit high engagement through facilitating liking and reposting. Especially, the activity of sweepstakes attracts the most popularity on Sina Weibo for Chinese fashion shoppers. However, this activity does not affect the amount of comment. Leeflang et al., (2014) realised that this might be because consumers prefer expressing their opinions based on the brand/ product- related information. For example, the below remuneration post achieved 14,800 reposts.

Please let us know which is your favourite coat below? You will have the chance to get your favourite one if you share this post on your own page before 20th November. We will send out 10 pieces of coats to our customers who have been selected (Uniqlo's Sina Weibo, 15th November 2016)

Outcomes: Consumer benefits from dialogic co-creation engagement

The netnographic data provide evidence of three kind of consumer benefits (utilitarian benefits, hedonic benefits and interpersonal benefits) gained from dialogic co-creation engagement on Sina Weibo.

Utilitarian benefits

The existence of utilitarian benefits from dialogic co-creation engagement is apparent in the social media marketing activities. The results show that consumers interact with brands on Sina Weibo not only to feel connected but also to seek more tangible value, which mainly includes informational benefits and monetary benefits. Moreover, many fast fashion brands provide consumers with some type of monetary incentive, such as a sales coupon or a sample item, which attracts a higher rate of response.

Hedonic benefits

The evidences also prove that hedonic experiential value is another kind of benefits that consumer gain from brands and consumers' interaction on Sina Weibo. Interesting topics such as humorous videos are able to release a sense of happiness to customers. Consumers enjoy the pleasant experience and pass their time quickly. Furthermore, the casual conversations between a brand and an individual customer can also help them to release their negative emotion.

Interpersonal benefits

Fast fashion brands strive to strengthen social ties among consumers by motivating them to share their opinions and experiences with others and touching consumers emotionally. Therefore, consumers gain acceptance and social support from engaging in conversation or sharing provocative ideas.

Conclusion

Firstly, two kinds of operant resources have been confirmed to be employed in dialogic co- creation, respectively are knowledge resources (consumer expertise) and social resources (social expertise). Interestingly, consumer expertise is shown to have highly employed by Chinese consumers in dialogic co-creation engagement with fast fashion brands on Sina Weibo. Specifically, Chinese fashion shoppers are more willing to express their opinions and share their previous experience during engaging in social media marketing activities. More so, they are actively involved in the information searching and alternative evaluation by applying their cognitive effort and memory. These findings are consistent with prior literature (Barrutia et al., 2016). However, another interesting argument yields from the findings that Chinese consumers use their social expertise no longer just based on their reference groups (friends and family) but also refer to brands and other consumers.

Secondly, four types of social media marketing activities that attracted consumers engaging in dialogic co-creation process have been identified. Findings reveal that consumers' opinions' sharing, brand/product-related information and physical/online store information are the major topics of organic e-WOM activities. These topics are not as different as the previous studies that have been assumed (Kulmala et al., 2012). However, the topic of physical/online store information usually received negative feedback in terms of the store environment, the customer service and logistics etc., which may impact on potential customers' impressions towards the brand. In contrast, the activities of amplified e-WOM related to celebrity or model endorsement and designer advertisement received a higher rate of positive comments compared to the other activities. Entertaining contents including greetings, inspiring slogans, anecdotes, humorous videos provided pleasurable experiences for consumers to strengthen consumers' connection to the brand. Remunerative posts with monetary incentives gained the most liking and reposting activity of all types of posts, but usually received the lowest level of commenting.

Last but not least, these dialogic co-creation activities generate consumer benefits when they are able to actively participate in exchanging the operant resources to facilitate their value creation. This conclusion is supplements previous findings proposed by Zhang et al. (2016) and Chen et al. (2015), which suggest that online consumers mainly gain utilitarian benefits (informational and economic incentives), hedonic benefits (happiness received and negative emotion released) and interpersonal benefits (social support and acceptance) from their online activities' engagement.

In conclusion, this study not only has theoretical implications for consumers engaging in dialogic co-creation process but also provides practical guidance for fashion brands to effectively administrate Chinese social networking sites. First, as the knowledge and information are the core resources adopted by consumers in dialogic co-creation, brands need to produce original posts to disseminate via social media interactions. More so, as the results indicate that different contents of Sina Weibo post influence consumer engagement, brand can design which type of activities they want to encourage consumers to get involve in. For instance, in order to achieve a higher amount of comments, brands should try to facilitate organic and amplified contents via e-WOM. Brands who want to enhance the level of likes and reposts, they can post the entertaining and remunerative contents. Lastly, brands using social networking sites as a platform for connecting with consumers should conduct continuous actions and appropriately manage consumers' responses.

Limitations and further Research

This study has several limitations. Firstly, as different categories of fashion brand may have various performance on social networking sites, which may elicit unique process of consumers engaging in dialogic co-creation activities (Choi et al., 2016), it is crucial to require further investigation in different context based on this theoretical model. Secondly, understanding the view of controversy of value co-creation (Plé & Chumpi-

taz Cáceres, 2010), future research needs to evaluate the outcomes not only focusing on positive effects but also on negative influence of dialogic co-creation engagement. Thirdly, this research is an exploratory study, and it remains unclear which did not provide a statistics examination for the theoretical model. It remains unclear whether there is a relationship between each stage of consumer engaging in dialogic co-creation process. The quantitative method is recommended to verify the relations of constructs and sub-constructs in the theoretical model.

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Appendix

Figure 1: Typical user's home page on Sina Weibo (Source: WCG, 2014)

Figure 2: Zara's homepage on Sina Weibo (Source: Sina Weibo, 2016)

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