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**Perceptions and attitudes towards sustainable fashion design:
Challenges and opportunities for implementing sustainability in
fashion**

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Perceptions and attitudes towards sustainable fashion: Challenges and opportunities for implementing sustainability in fashion

Abstract

The purpose of this research was to identify perceptions and attitudes toward sustainable fashion from personnel involved in fashion design and to uncover the challenges in implementing sustainable design practices. Data were gathered through qualitative open-ended questions in five interviews, and 50 fashion designers were selected as research subjects for a survey. The major findings of the research show that there are internal (personal and organisational) and external challenges to incorporating sustainability into the fashion design process. Internal challenges consist of the lack of consensus and knowledge regarding sustainable design, lack of design-led approaches implementing sustainability in fashion and perceived trade-offs with other design criteria, such as aesthetic styles, costs, and fashion trends. External challenges include the complexity of sustainability issues, perceived insufficient consumer demand, attitudes and behaviour gaps in consumer purchasing decisions on sustainable collection ranges and insufficient incentives or values for businesses to implement sustainable design strategies.

Keywords: Sustainable fashion; Sustainability challenges; Sustainable design strategies

1. Introduction

The fashion industry is one of the most resource-consuming businesses, associated with extremely complex global supply chain networks and fast cycles of production and consumption processes. There are many challenges confronting the fashion industry, such as the significant natural resources necessary in the textile and garment production process, the use of chemicals during cultivation and textile dyeing or surface treatments, worker exploitation and other social challenges within the supply chain (Allwood, Laursen, De Rodriguez & Bocken, 2006; Department for Environment, Food & Rural Affairs [DEFRA], 2007; Fletcher, 2008).

What is more, current clothing consumption patterns are considered unsustainable, particularly in developed countries. Clothing and textile consumption alone has been estimated to produce 2 million tonnes of clothing waste (a value of £38 billion) per annum in the UK; of this, 63% (1.2 million tonnes) ends up in landfills (DEFRA, 2007). Recent research from the Waste & Resources Action Programme (WRAP; 2017) shows that in spite of implementation of several strategies for sustainability in the fashion and textile sectors, clothing and textile wastes increased from 24 million tonnes in 2012 to 26.2 million tonnes in 2016 in the UK (WRAP, 2017). It is important to identify the root cause and barriers to incorporating sustainability in the fashion industry.

Fashion is inherently the most change-intense category of consumer products (Gam & Banning, 2011; Kunz, 2005), and the fast fashion trend is rapidly spreading in the fashion industry (Birtwistle & Moore, 2007). Farrer & Fraser (2011) argue that the current dominant fashion business necessarily embraces trends even if they are unwanted at the beginning. This phenomenon is predominant in the fashion business as a requirement to survive in trend-sensitive fashion markets.

The complexity of the material sourcing and textile manufacturing processes make it a challenge to distinguish what is considered sustainable material. Various natural raw materials and fibres might seem to be 'organic', but they can be contaminated during material extraction and fibre-to-fabric production processes within the current textile manufacturing system, including bleaching, dyeing, printing and finishing. A single material may contain both organic and technical components; this is the case in common blends of fibres, such as polyester and cotton (McDonough & Braungart, 2002). Due to the complexity involved in textile and clothing production processes, both retailers and consumers may find it difficult to make ethical choices.

Several studies (Armstrong & LeHew, 2011; Bhamra & Lofthouse, 2007; Curwen, Park & Sarkar, 2013; Lawless & Medvedev, 2016) have highlighted that decisions made during the design stage have substantial impact on the entire lifecycle of clothing, including material selections, fibre and textile production, garment manufacturing, distribution, marketing, consumer use and end-of-product disposal behaviour of consumers. However, there is not sufficient research available to identify the barriers and challenges involved in implementing sustainable design in practice.

Design is critical to the overall apparel production and consumption process. Designers can support the reduction of negative environmental and social effects by shaping consumers' behaviour (Lilley, 2009). Several studies have been conducted on consumer perspectives regarding sustainable clothing (DEFRA, 2008; Fisher, Cooper, Woodward, Hiller, & Goworek, 2008; Jorgensen, Olsen, Jorgensen, Hauschild & Hagelskjaer, 2006; Saicheua, Cooper & Knox, 2012). However, little is known about the perspectives of those involved with fashion design regarding sustainable fashion.

The main purposes of this research were threefold. (1) To understand and identify the perceptions, attitudes, and experiences of people involved with fashion design towards sustainable fashion. (2) To identify the challenges and drivers to practicing sustainable fashion design. (3) To examine the extent of use of existing sustainable design tools or resources. The findings of this research can enhance the understanding of current practices of implementing sustainability in fashion design.

2. Background research

Incorporating sustainability in the fashion business commonly involves multiple complex challenges. The meaning of 'fashion' commonly indicates that certain practices and styles are adopted by various groups of people within a limited given time (Easey, 1995; Yurchisim & Johnson, 2010). As the nature of fashion is based

inherently on the continuous process of change and the pressure to become new or be perceived as new, the fashion industry always strives for novelty, producing new garments in response to fast-moving consumer demand.

Conversely, the term 'sustainable' is essentially associated with longevity or maintenance at a certain level; it is derived from the function of ecosystems that assist themselves over periods of time (Thorpe, 2007). The goals of sustainability are open-ended and multi-faceted, considering the triple bottom line of environmental, social and economic benefits (Elkington, 1997) for current generations and the needs of future generations (World Commission on Environment and Development [WCED], 1987). Fashion often conflicts in concept with the philosophy of sustainable development. The concept of sustainable fashion remains ambiguous and it is widely debated whether the philosophy of sustainability can be applied to the fashion industry, as these two concepts are inherently paradoxical in nature.

Previous research (ComRes, 2010; Jorgensen et al., 2006; Carrigan & Attalla, 2001) has shown that there is a significant intention and behaviour gap in pro-environmental behaviour. Many consumers are concerned about environmental issues (ComRes, 2010), but there is little evidence that ethical issues affect consumer behaviour (Jorgensen et al., 2006; Carrigan & Attalla, 2001). Furthermore, there is a lack of consumer interest in prioritising sustainability in clothing choices, a lack of clear communication with consumers regarding the purchase of sustainable clothing and a lack of consumer trust of retailers' claims of sustainability (Saicheua et al., 2012). Some consumers do not trust that 'ethical clothing' is genuine (Intel, 2009) or distrust businesses' transparency regarding ethical production and green product ranges (Bhaduri & Ha-Brookshire, 2011).

What is more, there are various challenges involved in practicing sustainable consumption; these can be classified into three major experiences at the individual, social and cultural levels (Armstrong, Connell, Lang, Ruppert-Stroescu & LeHew, 2016). Individual barriers comprise a personal desire for new or perceived-as-new products, services and experiences. It is challenging for individual consumers to completely remove hedonistic needs, such as recreational or impulsive shopping. At the social level, consumers have been greatly influenced by their peer groups, especially the young consumer demographic, who experience feelings of inadequacy and dissatisfaction through constant comparison with peers and reference groups (Armstrong et al, 2016). At the cultural level, challenges involve inescapable triggers and temptation from various fashion marketing and merchandising tactics that impose constant changes of clothing and the desire to wear new fashion. It is important that personal needs motivate sustainable consumption, as it is necessary to connect with personal values or incentives of engaging pro-environmental activities. It is also necessary to support the social and cultural levels to understand the challenges involved in sustainable consumption and facilitate alternative marketing and merchandising activities.

Effective communication design allows better decision-making (Jorgensen et al., 2006). It has been found that communication between fashion companies and consumers is significantly important. Fisher et al (2008) have suggested that when participants are provided with information about environmental effects, they tend to reflect upon their behaviour and are willing to change that behaviour; this has been particularly demonstrated with regard to the energy effects of laundry and the social effects of clothing production. The research of Fisher et al. (2008) also suggested that

using the appropriate form of media for sustainability information would be useful to consumers.

Hence, this study employed an exploratory approach using mixed method strategies to identify the prior understanding of those in fashion design regarding sustainable fashion, their attitudes toward it and the challenges to sustainable design practices. Furthermore, the study examined design-involved people's awareness of existing sustainability tools and the kind of tools or methods that would be useful for design activities. The essential aim of this phase was to identify initial perceptions of sustainable design and the challenges to integrating sustainability into design practices.

3. Research methods

The overall research combined qualitative and quantitative methods, using both open-ended and closed-ended questions to ensure an in-depth and rich investigation of the key challenges involved in sustainable fashion and to understand perceptions and attitudes of the fashion design community. Combining both approaches allows a relationship to be established between variables using fixed designs, and qualitative methods can help develop explanations (Creswell, 2003). A list of sustainability issues in fashion was drawn up based on previous studies (De Eyto, 2010; DEFRA, 2008; Fisher et al., 2008; Fletcher, 2008). Five-point Likert scales were utilised to measure each category, and the list of various barriers was also drawn up based on previous research (DEFRA, 2008; Doeringer & Crean, 2006; Fisher et al., 2008; Fletcher, 2008; Jorgensen et al., 2006).

3.1 Data collection and analysis

Before disseminating the large-scale survey, five semi-structured in-depth interviews were conducted in person with fashion designers from the industry. The data

were triangulated in order to ensure validity of the research. The sampling strategy was based on purposeful sampling, limited to people involved with fashion design. Online and offline surveys were utilised and self-administered for fashion design-involved groups through a snowball sampling technique.

The sample was collected from members of ‘The Sustainable Fashion Network’ on LinkedIn and a convenience sample from professional designers, educators, and fashion design students in the UK. Respondents participated in the survey voluntarily. Therefore, respondents tended to be more environmentally conscious people than the general population of the fashion and textile design sector. A total of fifty-eight people participated in this study. Eight people did not fully answer the survey, and these were excluded from the analysis.

Table 1: Participants’ professions

Participants’ profiles (n = 50)	Percent
Professional fashion designers & design consultants	26%
Fashion & textile design students	38%
Fashion and textile design academics	16%
Researchers in sustainable design fields	8%
Fashion manufacturing and production fields	6%
Merchandisers, managers and marketers	6%

The data analysis was based on both quantitative and qualitative approaches. Qualitative text data were analysed based on thematic content analysis to identify emerging themes and variables. Transcripts were examined line-by-line and then categorised by open-coding to identify themes and compare the relationships with the other categories.

4. Results

4.1 Perceived definition of sustainable fashion

Participants were asked to indicate their current understanding of sustainability in fashion and textile design. Of the participants, 20% commented that they were ‘not sure of the definition of sustainable fashion’, 36% of participants provided short descriptions such as ‘environmentally conscious design’, ‘No more waste and everlasting materials’, ‘extend life’ and ‘eco-friendly products’. Another 44% of participants provided rich interpretations of sustainable fashion regarding their own sustainability practices and goals. Some definitions from participants are presented in Table 2.

Themes	Sub-themes	Example from participants' descriptions
Environmental sustainability	Environmentally friendly material use	<i>Environmentally friendly products, fair trade textiles (e.g., cotton, silk, etc.).</i> (Fashion designer)
	Extending the end-of-product lifecycle design	<i>To think about the lifecycle of the textile and consider the recycling/waste management of the product while designing it.</i> (Fashion and textile designer)
	Eco-friendly design process considering overall product lifecycle	<i>Fabrics/fibres produced in a sustainable manner, printing fabrics in a sustainable manner, washing fabrics, disposing of garments correctly.</i> (Fashion and design consultant)
Environmental and social sustainability	Lifecycle approaches involving designing emotional attachment	<i>My understanding of sustainable design was strongly influenced by books such as Cradle to Cradle and Emotionally Durable Design and also organisations such as Fab Lab.</i> (Freelance designer and consultant)
	Eco-friendly lifestyle	<i>I really don't have any clear concept about this but only understand one thing: this is the thing which links textile & fashion design with eco-friendly lifestyles through using upgraded technology & techniques of the green concept.</i> (Fashion designer)
	Environmentally conscious design and ethical production	<i>In its purest form it would necessitate that no process or resource used is detrimental to the environment or the people involved in the manufacturing / lifecycle. Also, the product would have the lowest possible carbon footprint and would be 'invisible' after use, i.e., would be used up entirely, would be biodegradable, etc.</i> (Academic from fashion design)
Environmental, social and economic	Design for future	<i>Meeting the needs of the economy, environment and society so that future generations will be no worse off than ourselves.</i> (Design researcher)

Table 2: Design-involved personnel's understanding of sustainable fashion

Most respondents from the designer group tended to focus on the environmental sphere, suggesting reducing fashion's environmental footprint and such practical actions. On the other hand, some participants from the sustainable design researcher or design manager groups emphasised the management side and the interconnected performance of environmental, social and economic aspects. It appeared that the interpretations of sustainable fashion varied depending on the roles of the participants.

The academic group and researchers mostly agreed with the definition of The Brundtland Commission report (1987) *“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”* (WCED, 1987, p43) and interpreted sustainability in fashion from more holistic perspectives than designers in the fashion industry. One sustainable design researcher noted, *“I tend to agree with the Brundtland report's definition of sustainability in 1987. There is a growing interest in sustainability in fashion and textile design in practice. However, there is a lack of tools to help designers to understand and implement it”*.

Researchers and business managers particularly highlighted the holistic view of sustainability and considered overall product lifecycles and how design can have wider effects on the environment and society. However, this group also emphasised the lack of appropriate tools to support designers to better understand sustainability and implement their design strategies in their practices. Some designers showed a simplistic view or misconception of interpreting sustainable design. For example, all-natural fibres (e.g., cotton and silk) are good for the environment, and man-made fabrics are not environmentally friendly.

4.2 Understanding degrees of awareness and practice areas

Participants' degrees of awareness and their practice area of sustainability were evaluated. This topic raised 17 distinct sustainability issues in fashion design that link with previous studies (De Eyto, 2010; DEFRA, 2008; Fisher et al., 2008; Fletcher, 2008).

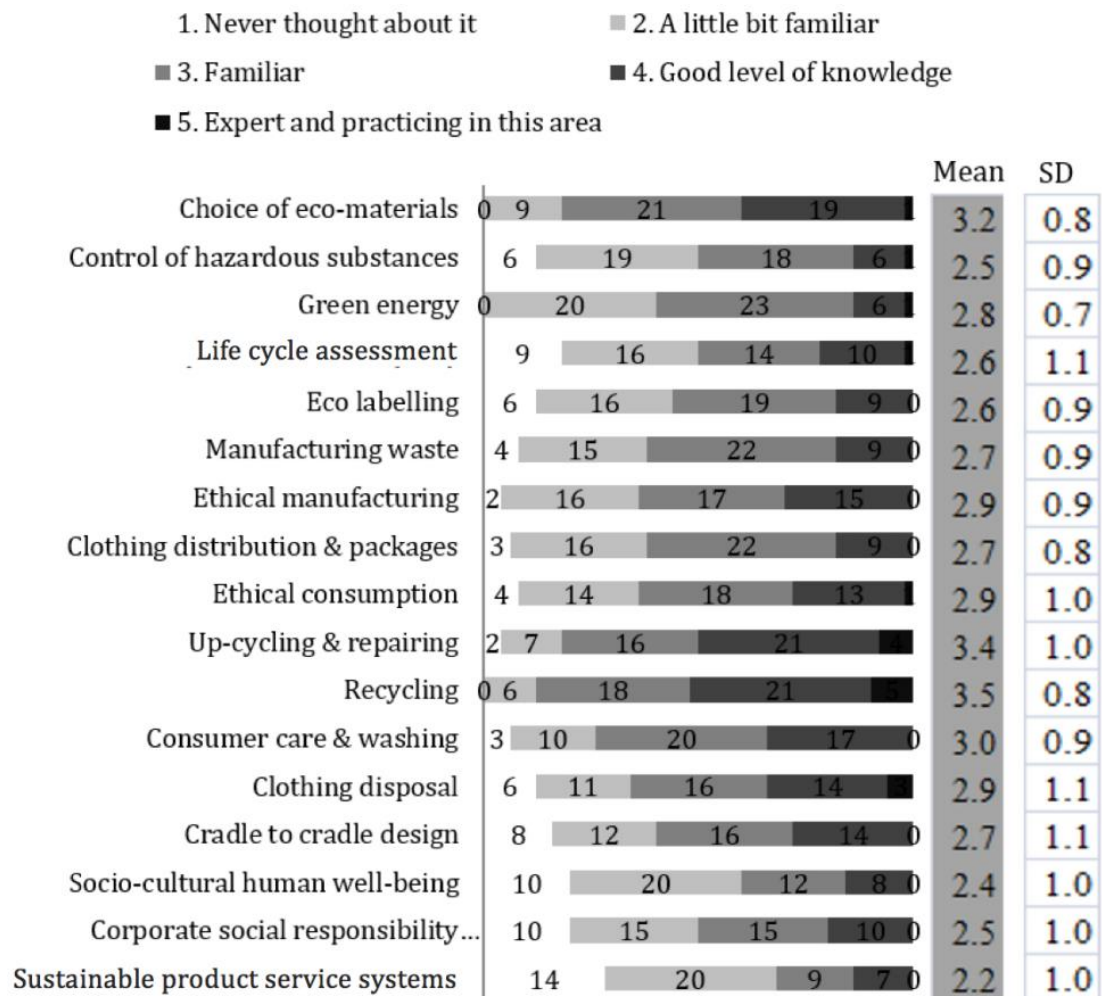


Figure 1: Participants' awareness level of sustainability in fashion

Recycling, up-cycling and repairing and the choice of eco-materials ranked as the top three levels of awareness. The lowest awareness levels in this category were regarding 'Sustainable product service systems', followed by 'Socio-cultural human well-being'. It was apparent that the participants had a relatively low level of awareness of these categories. With regard to standard deviation, 'Lifecycle assessment', 'Clothing disposal' and 'Cradle-to-cradle design' ranked higher. Those concepts have

high levels of pragmatic awareness, and some participants indicated that they had ‘never thought about’ or were unfamiliar with those categories.

On the other hand, ‘Green energy’ and ‘Clothing distribution & packages’ were in high agreement for relatively low levels of awareness and practice. ‘Choice of eco-materials’ and ‘Recycling’ had low standard deviations as fields with a high level of awareness and performance. In the previous question, 50% of respondents considered themselves sustainable designers who practice sustainable fashion. However, their specific implementations and current performance appeared relatively low.

4.3 Attitudes and actions for sustainable fashion

Sustainability in fashion and textile design was considered very important by all participants; the interest level was also relatively high, however, the participants’ involvement levels and prioritisation of design implementation were low compared with corresponding importance and interest levels.

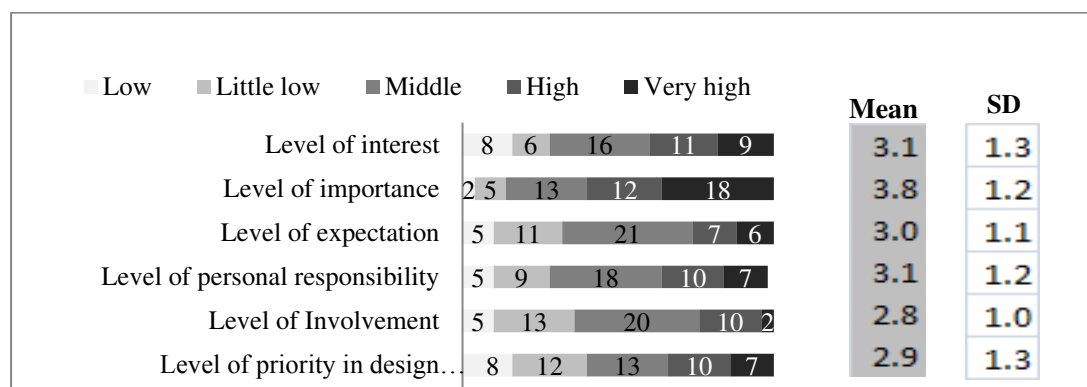


Figure 2: Attitudes and actions for sustainable fashion

Among all participants (N=50), 36% marked sustainable fashion as very important, and 24% of respondents reported it as important. Only 4% of participants indicated that sustainable fashion had a low level of importance. Most of the respondents had a very high level of concern about the issues, but respondents marked lower levels of involvement compared to their perception of the importance of

sustainable fashion. 4% of people were involved at a very high level, 20% of participants indicated a high involvement level, 40% of participants demonstrated neutral attitudes and more than 30% of people were hardly involved in implementing sustainable design strategies.

An open-ended comment section was included to gather more in-depth perspectives. Open-ended responses showed that, depending on participants' background knowledge and their position at work, their rating of interest in and importance of sustainable fashion varied. For example, designers were relatively more considerate about material choice (e.g., using recycled materials and renewable materials), eco-friendly ways of manufacturing, up-cycling old clothes, child labour, and the throwaway fashion culture.

On the other hand, managers and manufacturers considered expenditures of energy such as water, sustainable textile manufacturing, and toxic materials, wastes and chemicals from the factories. They also considered economic benefits and the implementation of sustainability were important in the fashion business.

Respondents from the academic group emphasised the importance of systems thinking, design action and integrating sustainability at the very beginning of the design process for holistically sustainable fashion design practices. One participant reported that *“Design is the usual basis upon which the processes of the manufacturing chain and marketing can be brought together to think and respond in a harmonious way using the same framework or system of thinking and action”*. Another respondent from the academic group stated, *“Textiles and fashion are of high-level importance in terms of economy and environmental impact and this needs to be addressed across all nations involved in these related activities and practices”*.

Regarding their involvement level in sustainable fashion, respondents also commented on the significance of involvement in sustainable design actions. One participant reported that *“people are happy to talk but less happy to actually do”*.

Other respondents claimed the importance of designers' involvement in sustainable design practices. *“For some designers, it is more important than others! Many companies (particularly large companies) are not set up to incorporate sustainability into their product [manufacturing] and lifecycle”*.

Although levels of personal responsibility were not highly ranked in comparison with associated interest levels, some participants reported critical viewpoints for individual responsibility in personal daily action. For example, one respondent stated that *“Without some level of personal responsibility and consciousness, then it is likely not to be taken on board by large organisations with beneficial effect”*.

4.4 Challenges for sustainability in fashion design

Although one concern of this study was linked to identifying perceptions regarding incorporating sustainability into fashion design, the following question was particularly to identify and measure the variations of participant viewpoints and collect their personal experiences through open-ended comment sections. Figure 3 illustrates the challenges and barriers respondents identified to adopting sustainable fashion. A five-point scale from ‘strongly disagree’ to ‘strongly agree’ was applied to gauge the degree of challenge for each category.

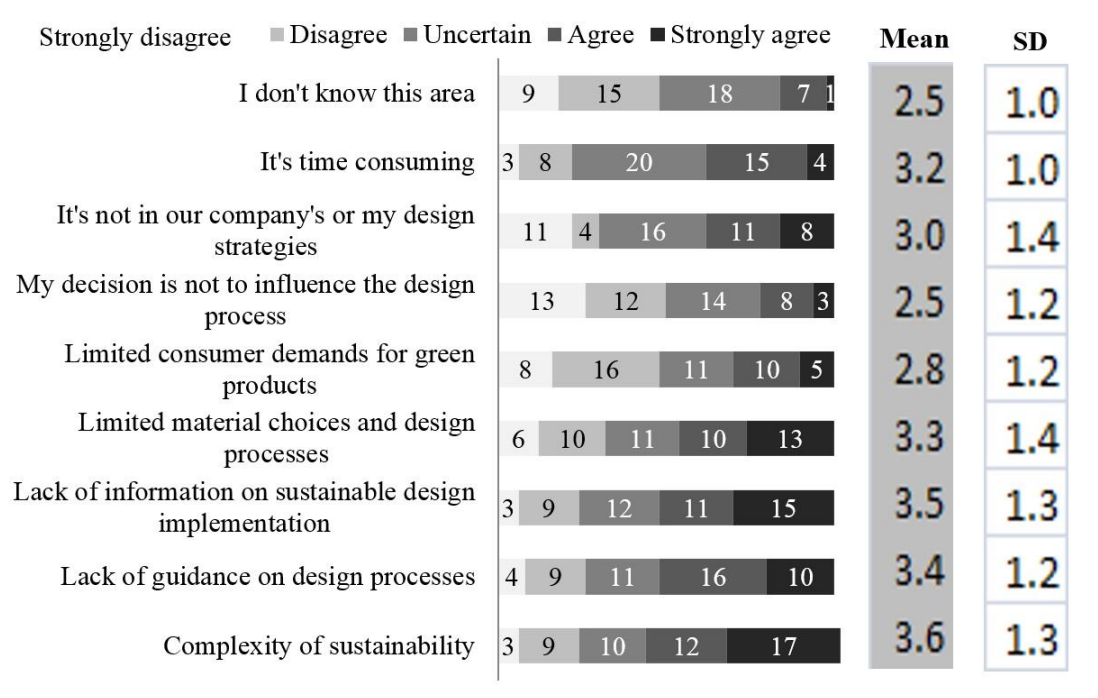


Figure 3: Challenges to adopting sustainable fashion

The highest agreement among participants was on the challenge of integrating sustainability into design practice. The second highest ranked category was a lack of information on sustainable design implementation. The third was the lack of guidance on design processes, and next followed limited material choices and design processes.

As Figure 3 describes, a number of people disagreed with the statements “*My decision is not to influence the design processes*” and “*I don’t know this area*”. Although respondents tended to be aware of sustainable fashion design, the complexity of sustainability has made it challenging for them to implement appropriate solutions. There are high standard deviations on the categories of ‘limited material choice and process’ and ‘not my company or my design strategy’. Both results indicate that respondents had many diverse perspectives on these statements. Some respondents considered this to be a challenging point, while others did not.

To acquire rich viewpoints regarding these challenging points, opened-responses were included in this section. It was recognised by most participants that there are internal and external obstacles to the adoption of sustainability in fashion

design. One respondent from the fashion industry reported on the lack of consumer awareness about sustainable design or products.

“I owned a shop last year that sold quality British-made garments that were all one-offs and made from up-cycled materials. Most of our customers bought our clothes because they liked the design and a lot of the times were not even aware of the importance of sustainable design. Awareness needs to be increased”.

Similarly, other respondents also commented on consumers’ insufficient awareness of sustainability and challenges with demand and supply. *“In industry production tends to be consumer-driven and cost-based”.*

Internal barriers also were indicated. In the previous section, the majority of respondents considered their decisions important and influential to the design process; however, some respondents reported internal barriers to sustainability in fashion design. One respondent from the professional fashion designer group commented that *“Sustainability is not high-priority in fashion design. Real design practices are mostly influenced by fashion trends related to aesthetics such as colour and shape”.* Another participant commented, *“In design practice, designers respond to design briefs from clients and have very limited space for sustainability if the company [does] not ask for this”.*

Indeed, these challenging points illustrate that sustainability issues need to be addressed by both consumers and the fashion industry. If consumers had more awareness of sustainability, they would ask for more green products and the fashion industry could adopt greater sustainability in their design processes. Although this survey was collected from a non-consumer group, it reinforced the view that fashion design-involved people desire increased awareness of sustainability among consumers. Furthermore, there was a tendency to burden designers when they want to incorporate

sustainability in design practices. If a company's ethos does not target sustainability in design, it is especially difficult to implement it in design practices.

4.5 Sustainable design tool use

Participants were asked whether they had used any sustainable design tools previously when integrating sustainability into their design process. From the 50 respondents, 70% replied 'No' and 30% replied 'Yes'. Of the tool users, 30% were from the academic area, including sustainable design researchers and fashion design teachers, while most of the design practitioners replied 'No'. Many practitioners were not very aware of existing sustainable design tools or relevant resources. They were asked about their tools to specify what kind of tools they used for design implementation for sustainable fashion.

Depending on their job, their experiences using existing tools varied. For example, one sustainable design researcher used tools such as product lifecycle analysis, Eco-Indicator, Eco-design Web and Design Abacus. Fashion design educators often used case studies, lifecycle frameworks and new materials analysis to introduce a mixture of theory into their practices. One participant from academia commented that *"In teaching, we design briefs with sustainability in mind if it is relevant and to make students more aware"*.

Although not many design practitioners revealed their experiences with tool use, some respondents commented on the use of eco-materials and different design technologies, such as laser cutting, digital printing and ultrasonic. Design practitioners commented that a sustainable design tool could be a practical solution to integrating sustainability in their designs. They tended not to have much awareness of existing sustainable design tools.

4.6 Useful resources for sustainable design practices

There was no distinct preferred resource for specific areas; respondents considered most resources equally useful for integrating sustainability in apparel design practices.

Table 3: Useful resources for sustainable fashion design

Participants' responses	Percentage
Case study of innovative concept and design thinking	11%
Sustainable consumption and product use	10%
Consumer behaviour research	10%
Identification of problems throughout the clothing lifecycle	9%
Case study of innovative material use	9%
Case study of eco-materials	8%
Case study of design process development	7%
Problem-solving techniques	7%
Sustainable product service system	7%
Idea generation tools & techniques	6%
Case study of clean technology	4%
All above	9%
Other suggestion	3%

The highest ranking was for 'Case study of innovative concept and design thinking', and next were 'Consumer behaviour research' and 'Sustainable consumption and product use'. Other suggestions indicated the need for:

- *“Very strong & keen knowledge about sustainable fashion and textile development as well as giving a very clear & easy understanding of the concept”.*
- *“Easy understandable and practical solutions for sustainable fashion”.*
- *“Enjoyable process or tool to apply in design”.*

5. Discussion

The early design stage plays a significant role in addressing the environmental and social impacts, influencing up to 80% of the environmental impacts of the overall product life cycle (Bhamra & Lofthouse, 2007; Curwen, Park & Sarkar, 2013; Lawless

& Medvedev, 2016). Despite the importance of the design stage and the designer's role in the fashion industry, there is limited research on understanding the fashion practitioners' perceptions and attitudes towards sustainable fashion and on the subsequent challenges in implementing the sustainable design into the practices. The study was focused on the challenges associated with implementing sustainability in fashion design. Furthermore, the study examined the designers' awareness of existing sustainable design tools and the tools or methods that would be useful for design activities in the future. The findings of the research showed that the major challenges of employing sustainability in fashion design practices include: (1) a lack of consensus over the meaning of sustainability in fashion design, (2) perceived trade-offs and the balancing of other design criteria, (3) limited design strategies for sustainable fashion, and (4) a lack of awareness of existing sustainable design tools.

5.1. Lack of consensus over the meaning of sustainability in fashion design

The overall understanding of sustainable fashion was mostly considered as environmentally conscious design, focusing on the selection of sustainable materials or the interpretation of sustainability as eco-design, which considers the overall clothing life cycle. Although participants showed high interest in sustainable fashion, overall the level of agreement about the meaning of sustainability was found to be low. Some participants were unsure of the meaning of sustainability. It is also recognised that the complexity of sustainability makes designers attempt to incorporate varied solutions.

Even though the design stage significantly influences the overall environmental, social, and economic impacts, without other actors' support (i.e. textile suppliers and garment manufacturing suppliers, merchandising, and marketing teams), it is very difficult to implement sustainability into design practice. In addition, it is important to

have a clear set of objectives from the organisational level to connect with the company's vision and philosophy for their long-term sustainable future and practices.

5.2. Perceived trade-offs and balancing other design criteria

Generally, participants considered sustainability as an important issue, but their design involvement and design implementation were relatively low. Their implementation strategy was often limited, and sustainability was not a priority in their fashion design practices. Designers often found difficulty with balancing other design criteria such as aesthetics, fashion style, colour trends, and cost. Selecting sustainable material ranges and eco-friendly manufacturing processes are often time-consuming and cost more money for incorporating sustainability in their design practices.

Implementing sustainability in fashion design is a challenging task, and it requires not only the designer's efforts but also other actors' contributions to realise their actions. Starting with textile and fashion designers, the designer could play the role of a catalyst in the organisation through collaborating with other actors, including pattern cutters, technologists, buyers, merchandisers, suppliers, and marketers. Those actions require a more collaborative process by sharing the sustainability objective and the dispersion of knowledge and directions of the design practices.

5.3. Limited design strategies for sustainable design

Incorporating sustainability into design practices is predominately focused on recycling. Designers could also extend their sustainable design practices to more eco-friendly dyes, printing, and surface treatments. They could also enlarge their sustainable design strategies, such as green packaging design, up-cycling design, and designing sharing methods, to utilise the end of product lifecycle. There is a lack of awareness of sustainable consumption in fashion and not much focus on sustainable consumption

strategies. There is a higher demand for useful resources for ‘consumer research’ and ‘sustainable consumption and product use’ strategies. In studies about encouraging pro-environmental behaviour, fashion practitioners have demanded easy and practical design tools for their day-to-day activities. In addition, the design tools should be enjoyable and should offer practical solutions that aid the designer in addressing sustainable consumption in fashion design. There is also a need for directions connected to design innovation and new strategies combined with lateral thinking.

5.4. Lack of awareness of existing sustainable design tools

The results of this study indicated that the professional designers and fashion design students did not actively utilise the existing sustainable design tools such as Life Cycle Analysis (LCA), Eco-design Web, The Life-Cycle Design Strategy (LiDS) Wheel, and more. Existing sustainable design tools are useful and help practitioners make better decisions by defining the problem, evaluating environmental and social impacts, and selecting better options. However, existing tools mainly focus on the evaluation of existing products and their environmental impacts, and the tools are less concentrated on supporting innovative design solutions for sustainability.

A design lead approach could be more beneficial to fashion and textile designers. According to Lofthouse (2006), the information of a tool should be more appropriate to a specific target group. Designers prefer highly visual and interactive processes that integrate easily into their practices. Indeed, it is important to consider whether developed tools can fit into specific target groups (e.g. fashion/textile designers) and how fashion/textile designers consider whether the tools can be effectively used in the time-sensitive fashion design sector. Furthermore, the tool needs to integrate into the creative design process and trigger design innovation beyond the measurement of clothing environmental impacts.

6. Conclusion

This study investigated the challenges associated with implementing sustainability in fashion design through identifying fashion design practitioners' perceptions, attitudes, and involvement regarding sustainability. Both the role of design and designers can be key to stimulating sustainable design practice; their roles could contribute sustainable development through shaping the design production practices and by influencing the consumption processes. Fashion design practitioners face both internal challenges (personal and organisational levels) and external challenges (social and cultural levels) in incorporating sustainability in the fashion design process. The personal and company levels of challenges comprise four factors. The first factor is the lack of consensus over the understanding of sustainability in fashion design. Second, there is a perceived trade-off with other design criteria, such as aesthetic styles, costs, and fashion trends. Third, there is limited awareness of existing sustainable design tools. Fourth, there is a lack of design-led approaches and tools to support sustainability in fashion design. The external barriers also comprise four factors. First, the complexity of sustainability issues is often beyond organisational control. Second, there is perceived insufficient consumer demand. Third, there are attitude and behaviour gaps in consumer purchasing decisions on sustainable fashion clothing ranges. Finally, there are perceived insufficient incentives or values for businesses to implement sustainable design strategies. This research identified several implications of incorporating sustainability in fashion design practices in both a fashion business and educational context and in the contributions of knowledge in those areas.

Further study can be conducted through cross-comparison case studies of small and medium-sized enterprises (SMEs) and big retailers by examining their challenges involved in incorporating sustainability into their business strategies. The future

research could be carried out through a cross-cultural study regarding how geographically different fashion designers may face different issues and challenges for incorporating sustainable design practices. It will also be useful to conduct a comparison study on how designers and consumer groups have different expectations, motivations, and challenges for implementing pro-environmental actions and how to identify barriers involved in consumers' green purchasing decisions and sustainable consumption.

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