Abstract

The aim of this research is to advance an understanding of how design in the fashion industry can be successfully managed to contribute to environmental sustainability. Its objectives are to investigate how fashion businesses use environmentally sustainable strategies and how designers contribute to the development of sustainable products. The article reviews the literature of the sustainability of fashion through the circular economy and design management. The research was conducted through semi-structured interviews and a quantitative survey of designers in the UK. A framework based on the level of business engagement in sustainability was used to structure the thematic analysis of the findings. The research demonstrates the relatively low influence of designers on sustainable fashion strategy and their engagement at a tactical organizational level. It concludes by developing a model for the integration of designers into the management of sustainable fashion business.

Keywords

Design, Design management, Sustainable fashion, Business organization

Highlights

- Technologists, buyers and sustainability managers tend to lead sustainable product development

- Designers have a strategic engagement when designing for longevity

- There is a need to improve designer education and training in sustainability

1. Introduction

The global fashion industry, driven by the 'fast fashion' business model has contributed to an increased volume of products with shorter life cycles, accompanied by deflation of retail prices (Cachon and Swinney, 2011; McColl and Moore, 2011; Sandvik and Stubbs 2019). Constant changes in fashion trends stimulate new designs and sales of fashion products that drive consumption and in turn contribute to its underutilization and waste (Ellen MacArthur, 2017). Fashion retailers have formed a significant part of this development and as production has extended to low cost developing countries, there has been an associated increase of environmental impacts in those regions (Fletcher, 2007; WRAP, 2012).

These developments have highlighted the extent of the fashion industry's sustainability problems, which are defined by the balanced integration of economic performance, social inclusiveness, and environmental resilience to the benefit of current and future generations (Pedersen, Earley and Andersen, 2019). Fashion not only needs to manage the use of very substantial amounts of materials and energy in production (Armstrong et al. 2015) but also its

social sustainability through the selection and monitoring of suppliers (Sinkovics, Ferdous Hoque and Sinkovics, 2016). Environmental impacts involve all aspects of the fashion business's upstream and downstream supply chains and their transparency but also the less controllable elements of clothing use and disposal (Curwen et al. 2012; Egels-Zandén, Hulthén and Wulff, 2015). The complexity and variety of fashion products, the need to differentiate through design content, respond to market pressures and work with short lead times present particular business challenges, not least to operationalize concepts of sustainability so that they become value-adding propositions (Stål and Jansson, 2017).

Awareness of the need for more sustainable strategies and practices (United Nations, 2016) has led to the development of a circular model of fashion production and consumption based on the principles of the circular economy. The circular economy is understood as an umbrella concept, a phenomenon that creates a relationship between pre-existing independent concepts that aims to develop a regenerative economic system by intentionally slowing, closing, and narrowing material and energy loops (Pedersen, Earley and Andersen, 2019). The aim is to keep resources in active use for as long as possible, extract the highest possible value from them while in use, and recover and recycle them at the end of their life (Ellen MacArthur Foundation 2017; Kirchherr et al. 2017; WRAP 2015). In these ways, the stages of the circular fashion production and consumption model extend into consumer use, collection, recycling and re-use of garments. Its implementation may be functional but also institutional as a firm-level enactment of corporate sustainability (Stål and Corvellec, 2018). An essential function for successful fashion businesses is design, which makes a significant contribution to environmental impact (Bhamra and Lofthouse, 2007).

Circular design overlaps in ethos and approach with sustainable design but aims to be

sustainable by default although more focused on the economic dimension (Earley and Goldsworthy, 2018; Pedersen, Earley and Andersen, 2019). The design phase accounts for a substantial part of a product's environmental impact; nevertheless, there remains a lack of exploration through academic design research on the ways in which design can contribute to circular business models (Pedersen, Earley and Anderson, 2019). Studies of fashion design focus on a wide range of practices, which demonstrate how designers are appropriately informed and able to influence the product development process (Black, 2008; Fletcher, 2007; Fletcher and Grose, 2012; Gwilt and Rissanen, 2010). In their conventional role, designers tend to have an influence on the choice of materials, aesthetics, silhouette, trims, manufacturing quality and the level of fashionability. In terms of circularity, their contribution is at its most pronounced when the environmental impacts of each stage of the product lifecycle are considered and reduced or eliminated (Braungart et al. 2007; Charter and Clark, 2007; McDonough and Braungart, 2009).

A number of approaches and tools have become available for designers to assess and reduce or eliminate the environmental impact of a product (Early and Goldsworthy, 2015; Gwilt and Rissanen, 2010). Designs can be more minimal to reduce the amount of material used and the silhouette made more adaptable to extend the garment life. Designers have a particular influence on the quality of clothes and their durability, thereby enabling them to be sold multiple times (Corvelec and Stål, 2017) and with recovery in mind, can design for upcycling with existing waste, to retain their value in use (Earley and Goldsworthy, 2018). However, away from the design process, designers tend to have a diminishing level of influence on the supply chain and subsequent activities. In part this concerns how fashion businesses are managed and the design function is organized: designers not only answer the design brief but also translate design values (Press and Cooper, 2017). These are supported by organizational

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systems in individual companies within their way of working (Turner, 2016). Therefore, to gain insights into the designer's contribution, it is important to understand their role within the organization (Press and Cooper, 2003). However, while the role of the design has been studied in circular business models (Pedersen, Earley and Andersen, 2019) less is known about the role and influence of designers in achieving fashion businesses' circular objectives.

The aim of the paper is to advance an understanding of how design can be successfully managed in the fashion retail industry to support the circular economy. Its objectives are first to define environmentally sustainable fashion product design through the lens of circularity and second, to assess the contribution of designers to sustainable design strategies and integrate them into working practices to achieve organizational objectives. The research will contribute to the development of sustainable fashion design practice by providing a critical review of the organization of sustainable fashion design.

2. Theory

Sustainable fashion design embraces a number of dimensions of the circular economy, from the initial selection of materials to the longevity of garments and their potential re-use. Based on 'cradle to cradle' principles (Braungart and MacDonagh, 2007), the overarching aim is to avoid waste by fully recycling materials in a restorative and regenerative closed loop system (Ellen MacArthur Foundation 2017). Textiles and clothing design, manufacturing and recycling systems are not yet sufficiently developed to achieve this aim, and less than 1% of raw materials used within the industry are thought to be fully recycled as a closed loop process (ECAP, 2019). However, the concept of circularity is now discussed and followed widely within the fashion industry as the prevailing approach to achieve sustainability using more commercially achievable approaches based on three key principles to guide design strategy

and practice (Global Fashion Agenda, 2019). They are to 'design out waste and pollution, keep products and materials in use and regenerate natural systems' (Ellen MacArthur Foundation, 2017:48). These principles can be applied at different stages of the product lifecycle to mitigate environmental impacts and address resource depletion.

Materials selection has become a highly significant topic in the fashion industry, spanning the use of resources, including water and chemicals to people employed in production and the supply chain. All materials used in the production of a product determine its environmental impact (Huang et al., 2009), so the selection of sustainable fibers, fabrics and components contribute to a reduced environmental impact of the materials stage of the product lifecycle (NIKE, 2014; Patagonia, 2009). Initiatives to reduce impacts in the manufacturing stage, include the efficient use of patterns in fabric cutting (Bevilacqua et al. 2011) and the reduction or elimination of harmful chemicals used in production processes such as dyeing and finishing. Lifecycle analysis (LCA) can map the entire fashion supply chain to provide designers with criteria and evidence for selecting sustainable design strategies.

Consumption waste refers to the 'use' and 'disposal' stages of the product lifecycle, which are much more difficult to assess, influence and measure. 'Use' is typified by energy consumption of the consumer laundering process and in this context, design strategies tend to be aimed at reducing rather than eliminating negative impacts (Fletcher and Grose, 2012; Gwilt 2014) typically in the design of clothes for less frequent washing and use of lower laundering temperatures to prolong clothing life (Ginetex, n.d.; Laitala et al. 2011). At the disposal stage, the environmental impacts are caused by waste volumes arising from discarded clothing (Allwood et al. 2006). Keeping products in use for longer has the potential to reduce overall consumption and the associated waste volumes (WRAP 2012). Clothing can be designed for disassembly, where products are taken apart in order to replace worn or damaged components

(Gwilt and Rissanen, 2010), and clothing take-back services and charity donations enable customers to deposit unwanted items to be recycled or re-sold (Balch, 2013; Cooper et al. 2013; Niinimaki and Hassi, 2011). Textile waste itself can be upcycled and refashioned through design (Fraser, 2011) to make it a more valuable new product (Earley, 2011; Politowicz, 2009).

A focus on durable design enables products to have a second life via alternative business models such as second-hand and vintage clothing, and in product-service systems such as leasing or renting (Gwilt, 2014). Products can be designed to be physically durable, but also to create an emotional attachment between the consumer and product to keep it in active use for longer at the 'use' phase of the product lifecycle (Fletcher, 2007; Gwilt 2014; Gwilt and Rissanen, 2010; Mugge et al. 2005; Schifferstein et al. 2004). Some fashion brands at the niche, luxury and mid-market levels emphasize durability and 'considered' design to increase their brand value with customers (Fisher, 2015). Design for physical durability involves the development and testing of yarns, fabrics and garments to meet specified performance standards that can withstand prolonged wear (Cooper et al. 2013), whereas design for emotional durability is more difficult to define and includes a range of approaches to promote fashion collections that are less trend driven, more seasonally adaptable and versatile in terms of fit and styling. These features can influence consumers to approach fashion consumption in a more considered way (Fletcher 2012). Based on the association between a focus on style, sustainable purchase and disposal behavior, designers can help consumers understand their preferred style and cuts that would suit their body shapes, so that they feel confident in their clothes and value them as a result, theoretically leading to reduced consumption. This may persuade them to invest in better quality clothes and to wear, care and keep them longer and balance out the perceived financial, social and psychological risks of clothing purchases (Harris, Roby and Dibb, 2016).

In practice, fashion brands and retailers use multi-disciplinary teams to design, develop and procure products, which encompass the design, technical and commercial buying functions (Goworek 2010). Sustainable design approaches that seek to reduce the environmental impact of materials and manufacturing processes, and increase physical durability are rarely led by the retail designer or design team, but by technical and sourcing experts with specialist knowledge of materials science, textile technology and supply chain management (Cooper et al 2013). However, the concept of enhancing emotional durability to reduce consumption is more design-led and tends to be user-centered, providing an increased opportunity for designers to direct and influence the process (Chapman 2015).

For the successful adoption of sustainable design practices within mainstream fashion companies, it is important that design and product development teams are informed, resourced and managed and that each life cycle stage is considered against market, technical and cost aspects (Charter, 2018). To achieve these objectives, Curwen et al. (2012) demonstrate that designers require a 'mandate' through the alignment of business culture, objectives, structure and processes. Further, the designer's engagement with the organization concerns not only the specific creative or technical aspects of a particular product but also "organizational, behavioral and managerial factors which set the product in the context of a wider picture of production and consumption" (Moultrie, n.d.). From these managerial perspectives, designers should be engaged with the organization's approach to sustainable product design.

The influence and role of the designer in the organization has an important impact on sustainable fashion policies. Design direction has a strategic perspective that is implemented at tactical and operational levels (Borja de Mozota, 2006; Cooper and Press, 1995; Topalian, 2014). The strategic level of design management is primarily concerned with the idea of 'responsibility' for design (Topalian, 2014), positioning and building competitive advantage

(Borja de Mozota, 2002; Pitsaki and Rieple, 2013) and as a holistic activity unifying all areas of business operations (Hands, 2017). Size of organization too, influences design and sustainability. Mid-market fashion companies are less likely to have well-defined long-term sustainable aims than large mass market retailers (Cooper et al. 2013), while the smaller organizational structure of SMEs provides the designer with the potential to strategically influence the whole product lifecycle (Delong et al. 2013; Lawless and Medvedev, 2016).

At the tactical level, design management is concerned with the systems and processes needed to deliver against business sustainability targets. In the fashion industry, the business strategy tends to influence how design and NPD teams are structured and managed within the cross functional category team, ensuring that sustainability goals are built into design briefs and key performance indicators (Best, 2006). Here too a distinction can be made between large and small fashion businesses. Size and infrastructure can build specialist technical knowledge within the NPD and sourcing teams to achieve sustainability goals, allowing designers to focus on the creative aspects of the product (H&M, n.d.; M&S, 2014). However, in small fashion businesses where sustainability is integral to the business concept, the ability and agency of the design manager to lead a more innovative design process may be much greater than in larger businesses (Black, 2008; Lawless and Medvedev, 2016).

The operational level is concerned with the design and delivery of tangible products and services. In the fashion context, this relates to the design and specification of the product in terms of aesthetics, cost, material selection and physical performance (Best, 2006). The designer's role may vary from business to business and between different levels of the market, which in turn has a bearing on the skills and knowledge required (Hands, 2017). Therefore, the agency of the designer to affect the design processes and materials used varies greatly.

Within cross-functional fashion retail product teams, it is not necessarily the designer who makes the decisions about sustainable design approaches based on material sourcing and manufacturing methods; as previously mentioned, product design is also influenced by technologists, buyers and suppliers (Goworek, 2010). Moreover, previous studies have found that designers in well-established fashion businesses are rarely sufficiently empowered to influence the design process towards sustainable practices to incorporate these approaches, and in many cases may not have the awareness or technical knowledge required (Palomo-Lovinski and Hahn, 2014). Fashion design and NPD teams may need empowering to adopt more sustainable products and practices (Curwen, et al. 2012; Epstein and Roy, 2014). Furthermore, the range of known sustainable design practices are often at odds with other profit-related business objectives, as they are perceived as being more costly and time consuming to achieve (Cooper et al. 2013).

These organizational dimensions in design management provide a process for aligning strategic, tactical and operational sustainable design activities to support the development of more sustainable working practices (Cooper, 2012). However, this is less well understood in the context of sustainable fashion design amongst fashion retail brands. To develop knowledge of the integration of sustainability and sustainable design strategies within organizations, Williams (cited in Holland and Lam 2014, p.251) defines three categories of company engagement. An 'ideal' approach to sustainability, aims to achieve a fully integrated and planned circular design approach, but tends to be developed incrementally from a starting point of established industry systems and practice. Mainstream brands such as NIKE, M&S and H&M in the 'ideal' category are considered leaders in sustainable business practice based on their well-established interventions which are widely publicized and seen as shaping the debate

within the industry (Earley, 2017; H&M, n.d.; M&S, 2014; 2015; Nike, 2014), but are also criticized for retaining perceived 'unsustainable' practices while they develop their business approach (Global Fashion Agenda, 2019). They have also engaged in industry-wide sustainability initiatives and are involved in funding large innovation projects. Second, companies can 'adapt' sustainable approaches, taking a similar approach to leaders in the 'ideal' category but with strategies that are smaller in scope and less well established (Cooper et al. 2013). The third category of fashion retailers 'adopt' sustainability from when they start out and are normally defined as 'niche' or specialist businesses. These companies have sustainability integrated into the business model from the outset and are seen to lead sustainable design practice within their market niche. The temporality of these stages is significant because organizational culture can hinder change and adoption of new ways of working once the shared, implicit assumptions of the company have been learned and enacted over time (Schein, 1996; Weerts, Vermeulen and Witjes, 2018).

3. Method

Given the importance of the designer in new fashion product development (NPD), the first question in this research is research question in this research, is to what extent do designers influence strategic decision-making about sustainability? The second research question is, how does tactical and operational management by design leaders, design managers and designers achieve sustainability objectives? To answer these questions, Williams's model is used as a framework in which to examine the designer's organizational role in creating and supporting sustainable design practices.

The research was informed by an inductive approach to data analysis where the

researcher interprets the emerging themes to draw conclusions and make recommendations (Creswell and Clark, 2011; Creswell, 2013). It was undertaken in two stages. First a survey was sent to 250 fashion designers and design managers, to understand the broader awareness of design for sustainability and the extent to which sustainable design techniques are adopted. The designers were employed by mass and mid-upper market level brands retailing in the UK, with a stated sustainability strategy and/or the UK's SCAP (Sustainable Clothing Action Plan) membership.

The response rate to the survey was low, with only sixteen replies; consequently, the results were analyzed for their descriptive qualities, and integrated with the themes emerging from the qualitative interviews. Second, in-depth interviews were used to access individuals' first-hand experience of the strategies and organization of sustainable product design, and their perceptions of the opportunities and barriers for wider adoption of more innovative design initiatives. At the strategic level, the aim was to identify how business sustainability goals are interpreted into strategies for design departments by fashion design leaders, and to assess their involvement in goal setting.

Participants for the qualitative interviews were identified using purposive selection described by Maxwell (2013) as an approach where the people, settings and activities are selected deliberately to provide information that is relevant to the research question and aims of the study. Due to the problems encountered in contacting designers to participate in the survey, seventeen industry experts were selected from nine national and international fashion brands and two sustainability organizations. These participants were different to those who took part in the survey. The brands were either based in the UK or with a UK retail presence and of differing size, market level and customer focus. Each had a stated commitment to sustainability

that could relate to or influence design strategies. The participants were drawn from different functions in the organizations. Sustainability experts were selected to gain an understanding of business approaches to strategy setting, as these experts tend to act as champions with responsibility for driving and influencing change across the organization (Epstein, 2014). At the tactical level, design managers were selected for their insights into how sustainable strategies are communicated and interpreted into plans, processes and criteria for managing the design process. At the operational level, selected participants included designers, technologists and buyers with a direct influence on the specification of the product and its environmental impact. The two participants from sustainability organizations had worked with UK fashion brands to support them in developing a business sustainability strategy.

The interviews were carried out over a period of three months and transcribed shortly afterwards. Throughout this process, the researcher made memos (Miles and Huberman, 1994) identifying any emerging themes that could allow the research process to be refined as it progressed, as suggested by Bryman (2008). A process of thematic analysis was used to identify the key trends and ideas. NVivo software was used to organize and code the data; some of the codes were informed by the research questions based on the literature, while others emerged from ideas and themes suggested by the research participants. A second level of analysis was undertaken, where the data was grouped into themes that distinguished between description concerned with actions and activities, and meaning, concerned with attitudes and opinions (Bryman, 2008). The evaluation of design capabilities and involvement in relation to strategic sustainability goals was undertaken using Williams's levels of engagement framework (2014) which was the basis for grouping the emerging themes in the final analysis (Table 2).

4. Results

The companies represented by the interviewees were categorized by level of sustainability engagement (Williams in Holland and Lam 2014), and the data was analyzed with the survey results to explore common themes and approaches to sustainable fashion design in each area (Table 1). Companies in the Ideal category reflected the current thinking on best practice in sustainable fashion design approaches and actions. The Adapt category represented companies that were taking a similar approach to leaders in the Ideal category but with strategies that are more limited and less established. This was further split into Early Adapters and Late Adapters to distinguish the respective level of progress between the brands in this section. The Adopt category represented niche or specialist businesses that have adopted sustainability as a central concept from the outset. The categories are defined by the level of sustainability engagement and the criteria of the breadth and depth of the companies' sustainability strategies found in their future focused innovation projects, and the level of transparency in external marketing and business communications.

The research results are organized as follows: first, there is an analysis of the brands' approaches to defining the environmental sustainability strategies, policies and targets that affect the design of fashion products. Second, the extent to which the design function influences the strategy is identified, along with an assessment of how design departments and designers contribute to delivering these strategies at tactical and operational levels. The third section discusses a range of business structural and operational factors that affect the role of the design in relation to sustainability. These include the impact of sustainability on the working practices of designers and other members of the new product development (NPD) team, the challenge of integrating sustainability into the business and the opportunity to engage design leaders and designers in a more integrated way.

Table 1 Companies represented by interview respondents in relation to Fashion

4.1 Sustainable fashion design strategies

The most widely practiced sustainable design strategies addressed the first circular economy principle of designing out waste and pollution. All survey and interview respondents reported that their businesses had policies on, and targets for, sustainable raw materials and seek to reduce environmental impacts of both natural and synthetic fiber production. Additional goals included working towards developing sustainable manufacturing processes that reduce water consumption and chemicals in processing, as well as increasing energy efficiency in factories and transparency in sourcing. Seven of the brands participating in the research were signatories of SCAP or members of the US Sustainable Apparel Coalition (SAC). As a result, they had to measure and report on their progress towards sustainability but it also encouraged them to focus on those areas which would deliver the most rapid results.

A key insight from the survey was that strategies mostly related to sustainable fibers and manufacturing processes. This was supported by the interviews, which demonstrated a focus on strategies that were least disruptive in new product development and were relatively straightforward to measure for reporting purposes. When setting their strategy, brands tended to focus first on their largest volume fibers and product lines to make meaningful and rapid reductions on environmental impacts. The most significant fiber was cotton, which can account for a considerable proportion of fiber usage; one supermarket stated that cotton is 'at least 60% of all we do on clothing'. The most sustainable option is organic cotton which is grown without the use of chemicals even though it accounts for only 1% of the market. Each category demonstrated different targets for sustainable cotton.

Recycled fibers also formed part of the sustainable materials strategy for most of the brands investigated, and has the potential to address the circular economy principle of designing out waste. However, they are not widely available, tend to be poorer quality than their virgin equivalent, and are normally limited to single fiber content fabrics. From a strategic perspective, textile to fiber recycling was discussed by the majority of interview respondents as being the most significant potential breakthrough towards achieving a circular system if it could be developed on a much larger scale. Niche brands demonstrated more creative approaches to recycling in their sustainability strategies and Adopt brand J's concept was entirely based on the sourcing of pre-consumer waste yarn, which is a form of material recycling. Some more mainstream brands had also engaged in projects or collections that involved a form of recycling. The designer survey, although very limited, supported the interviewees in terms of their experience of business priorities for sustainable materials. In terms of sustainable manufacturing processes, a significant number of the designers responding to the survey stated that they used some form of 'eco dyeing' in the products they designed with some reporting use of natural dyes which have a lower environmental impact.

An important insight into sustainable design from the interviews, was the concept of product durability or longevity, which is linked to the circular economy principle of keeping products and materials in use. Ideal and Early Adapt categories considered durability important in the design and new product development (NPD) process, and for at least one Adopt brand it was central to their concept and values behind the business strategy; the collection is promoted as being made to durable standards and possessing a timeless, classic quality. For the smaller brands longevity can form a strong link to the brand ethos and is integrated into the design concept of the collections. Larger brands in the Ideal and Early Adapt categories had a different focus on physical durability and the technical engineering of core products, such as basic t-

shirts and schoolwear, as well as the development of 'longer protocol testing' regimes. Least convinced were the Late Adapt brands who understood the concept of durability as a sustainability strategy but did not think it would work commercially: it was difficult to make a business case for a strategy where customers are influenced to 'buy slightly less because everything is lasting longer'. Design for durability was also reported by some of the respondents to the designer survey as a sustainable design approach. A considerable number also stated that technical durability finishes and manufacturing methods are applied to the products they design.

Some brands in the Ideal, Early Adapt and Late Adapt categories had engaged in circular design approaches that were seen as being more ambitious and 'niche', as they are difficult to scale up and have practical and commercial limitations. For instance, one Ideal brand had produced a sustainability themed collection based on upcycling post-consumer waste, which presented challenges for designers as consumers have certain expectations of fit and aesthetic properties associated with products, especially when there is a high emotional connection to the brand. Another company in the Early Adopt category developed a 'disassembly' initiative where a product was successfully designed to be taken apart and re-used at end-of-life, but the lack of supporting infrastructure to collect garments from consumers made it uncommercial. Adopt brand J's central concept of using only pre-consumer waste materials is a recycling strategy but presents certain creative, commercial and supply challenges as the quality, color and volume of yarn available is not consistent.

4.2 The contribution of designers to the delivery of sustainable fashion strategies

The previous section identified the key sustainability strategies used by fashion businesses to reduce the environmental impacts of clothing products. This section analyses the

designers involvement in contributing to and delivering these strategies in relation to the strategic, tactical and operational levels of the business.

The findings from the interviews demonstrated that businesses in the Early and Late Adapt categories, and some in the Ideal category, the design function had little influence in setting the strategy for sustainable fashion and designers have limited involvement in sustainable design practice. This was supported by the survey, which indicated that designers were advised on which sustainable materials and processes to use. There was more evidence of design's contribution to both strategic planning and design practice where sustainability was central to the ethos of the business as demonstrated by companies in the Adopt category, and by smaller Ideal brands. Apart from one niche brand in the Adopt category, most of the interviewees confirmed that designers lacked significant involvement or influence in either establishing the design strategy or the sourcing process for sustainable fashion products. In the case of supermarket brand E, the buying and design director stated that the sustainability strategy is 'coming from the top, not from design'. The design function reported through a director with a buying background which suggests that 'design' is only tacitly represented at main board level. Another brand in the Ideal category described the profile of the design function being perceived as less important or influential than others in the business, stating that 'when strategy is being discussed, they're just not in the room. They're brave in terms of generating products, but they're not taken seriously as business people'.

Fiber choice was the most important element in the design and specification of sustainable fashion products, and included materials with lower environmental impact, and recycled fibers. Designers tended to be informed about the materials and processes they should use from designated suppliers, with a focus on core fabrics where volume lines can make a

significant contribution to the achievement of sustainable fiber targets. The larger companies in the Ideal and Early Adapt categories have specialist sourcing, sustainability and technical teams responsible for developing the appropriate materials and processes, often working closely with overseas buying offices. For the designer, it is generally a matter of assigning a nominated fabric to a new garment shape or silhouette. As one respondent noted "it all starts with design obviously, and if design aren't finding or…….being provided with the right fabrics or fibers…..they aren't going to choose it". By contrast, in the Late Adapt category sustainable fiber strategy mainly involved technologists and buyers in working towards sustainable goals; designers weren't engaged because 'they weren't seen as a priority'.

Brands in the Ideal category were seen to involve designers at tactical and operational levels to some degree in the sourcing of sustainable materials and processes, although in a fairly passive way. One company had a fiber specialist working on the development of sustainable fabrics alongside designers, who was seen as part of the design team. Another interviewee stated that whole NPD team (including the designer) were equally responsible for achieving the sustainable fiber targets for the product area and that the team had a degree of autonomy in how this was achieved.

The role of the designer was more visible in implementing durability and longevity strategies. For some Ideal and Adopt brands, durability was associated with brand identity, which informed the approach to design. Their clothing collections were less trend driven and more influenced by an internal design ethos and design 'handwriting'. These fashion brands are positioned at the mid to upper levels of the market and the designer had an important role in maintaining the longevity of all aesthetic components in the design concept. For some brands the longevity of color and fit as well as design identity allows customers to mix and match

styles from one season to the next: a brand ethos can be 'based on timelessness, longevity and durability, the idea of considered design.' However, technical durability practices needed to be incorporated with a specific focus on the upgrading the quality of cotton to reduce pilling in knitted fabrics and investigating long protocol testing regimes to evaluate the products' potential lifetime. Larger brands similarly adopted a technical approach to durability in some of their ranges but with less integration into the creative design concept.

The development of niche sustainability collections by brands presented challenges that more clearly required creative design solutions. Ideal brand A's 'upcycled' collection entailed designers resolving certain practical issues relating to fit and color due to the limitations of the post-consumer waste they had to work with. Similarly, Adopt brand J's recycled pre-consumer waste knitwear posed different creative problems caused by the limitations and uncertainties of supply.

4.3 Design, organization and working practices

The interview findings highlighted a range of organizational factors that limited the role and influence of design in sustainability. Designers, technologists and buyers generally worked together in cross-functional NPD teams where the sustainability agenda tended to be led by technologists who are more knowledgeable about fibers, materials and processes. At a tactical level, nearly all businesses have a separate sustainability team who support NPD teams to achieve sustainable goals. Most of the sustainability managers have technical, rather than design backgrounds and report into a sourcing or production function with the aim of developing and source sustainable materials and processes. For the sustainability managers, the technologists were their 'sort-of ally' in operationalizing the sustainability agenda. The buyer

had a significant contribution to the achievement of sourcing and supply targets through their influence on price and order quantity. In one larger organization, the Corporate Social Responsibility (CSR) team demonstrated the significance of the buyer's influence, where '....without the CSR team having the relationship with the buying team, they'd have really struggled to get going on this strategy.'

The increased complexity of the business structure and NPD processes particularly when companies are in the early stages of implementing sustainable strategies, led to problems with designer engagement. Sustainability managers referred to the challenges in terms of 'working across silos', acting as a 'bridge' and 'pushing the agenda forward'. Moreover, engaging designers was not a priority for brands in the Early and Late Adapt categories, where the strategies were technically driven and commercially managed, rather than design or marketing-led. The low level of sustainability integration within product teams, and the association with technical, rather than creative processes created a perception that sustainability did not really affect the designer.

Several of the interviewees suggested that designers' engagement in sustainability could be increased by addressing some of the structural barriers. One approach was to create sustainability 'champions' within the business, individuals who are personally interested in sustainability and proactively push the strategy forward. Some Ideal brands sought to formalize this by creating sustainability committees or ambassador schemes where representatives with an interest in sustainability from each business function, including design, could meet to discuss and progress the agenda. These initiatives furthered the embedding of sustainability into the operational culture and the integration of job roles. Where this integration took place in the Ideal category, it was evident that designers were more engaged for example by contributing to

team-based sustainability performance targets.

Barriers could be further reduced by overcoming the negative perceptions of the designer's ability and to harness their knowledge of sustainable product concepts. One respondent arranged a series of training courses on design for durability for designers, buyers and technologists, and commented on the change in designers' perceptions of how their role could influence sustainability '...so when we start explaining the concept of the importance of design, they are pleasantly surprised that the function is actually involved" . Others discussed the need for fashion designers to develop new skills and knowledge to enable them to apply existing creative skills but also increased technical knowledge of sustainable materials and processes more successfully to sustainability concepts. Brands in the Adopt category commonly used this approach as they needed to underpin their business with a more holistic understanding of sustainability

5. Discussion

The findings extend earlier research about the complexity of the circular design model and the challenges to sustainable strategy. The analysis identified two sustainable fashion design challenges and opportunities, first the development of the 'circular' approach to fashion design, and second, the application of design management theory to enhance design's contribution to organizational sustainability objectives.

Sustainability strategies are typically associated with the 'materials' and 'production' stages of the product lifecycle. They focus on sourcing for core volume lines where the business's competitive advantage is generally achieved through price and quality rather than through product differentiation. Implementation is largely incremental in which there is an

element of a 'business as usual' approach. By contrast, brands in the Ideal category discussed their intention to move towards more circular approaches to design that could address sustainability throughout the product lifecycle, rather than just at the materials and manufacturing stages. These brands saw future opportunities for competitive strategy based on product differentiation by engaging the consumer emotionally through the branding, identity and creative concept behind sustainable products. Further, many interviewees proposed approaches to slow down consumption, such as design for durability, as a potential solution for a more sustainable fashion industry. Smaller, more upmarket brands are better placed to employ a durability strategy as it relates to their brand identity and concepts of considered design and consumption. With this positioning, the use of better quality materials and manufacturing methods to achieve durable products can command higher retail prices. This is where designers have an opportunity to champion and extend their influence over the strategy as it requires creative skills and empathetic customer knowledge.

The research demonstrated that designers are less directly involved in sustainable leadership than other members of the NPD team. The design role in many businesses has a narrow focus and is mainly concerned with researching fashion trends to interpret into design sketches and specifications with aesthetics being the main driver. Fibers and materials for nominated sustainable products are directed by sourcing teams, and the short lead times demanded by the fashion industry make this a particularly difficult area for designers to manage. However, the Ideal brands that have more established sustainability practices seek opportunities for designers to increase their contribution: they are more likely to be involved where the brand ethos and identity has sustainability embedded in their design concepts. For a more strategic role, designers have to promote a broader organizational discussion of design-led solutions by engaging more formally and proactively with sustainability ambassadors and

champions.

It is clear that design leaders need to be knowledgeable and well informed to build a business case for design's potential contribution to sustainability. Larger, more mainstream brands engage with durability, but this is from a technical performance perspective rather than linked to a creative concept. For these businesses, designers' knowledge of the product and market contributes to thinking about how durability might lend itself to alternative business models such as leasing and renting. Design for recycling, disassembly and zero waste pattern-cutting have also been investigated by some of the Ideal retailers but have not achieved any success at scale. Although these approaches work from a technical point of view, they have certain practical and aesthetic limitations. The importance of marketing these collections in the right way was emphasized strongly, to engage both the consumer and the internal NPD teams.

A skills and knowledge gap was identified among designers, with a need for better technical knowledge of fibers and textiles and an understanding of the supply chain and sustainable design approaches. The findings indicate that design leaders and managers have not prioritized sustainability for design teams and are only beginning to investigate their potential contribution. The research demonstrates that they could be more effectively engaged if they are able to evaluate sustainable materials, utilize suitable tools to support them in making design decisions and to apply creative thinking and user perspectives to products and marketing concepts. This supports Faludi's assertion (2017) that designers and managers should understand what each design practice offers and how to combine multiple practices and elements of them to maximize their value.

The development of a design management audit tool will enable fashion brands to

identify, plan and develop strategies to enhance design's contribution to established and emerging sustainability approaches. The Design Atlas (Hands 2011) provides a framework to structure a range of 'design strategy domains' in planning, processes, resources, people and culture for design leaders and managers (Table 2). The planning section relates to the strategic business level and emphasizes the importance of the design function being represented. Processes are concerned with developing sustainable design competencies within the team, along with encouraging the use of creative thinking and consumer knowledge to provide sustainable design solutions that increase value through product differentiation. It also prioritizes the development and adaptation of appropriate sustainable design tools that are user friendly and effective. The 'resources' section is concerned with the allocation and management of budgets, and emphasizes the need to prioritize time and finances to training, while maximizing cost neutral opportunities to develop the design team. The 'people' section proposes that designers should have a range of skills that act as a foundation for sustainable design and includes a basic knowledge of textile fibers and processes, and an understanding of how supply chains work. In addition, a proactive approach to cross-functional and multi-disciplinary working is advised to broaden the scope of the design role and to allow designers to learn and share knowledge effectively. The 'culture' section is about raising the profile of design within the organization by demonstrating the contribution it can make to sustainability, to maximize opportunities for design teams and to reduce stereotypical perceptions.

Table 2 Design Atlas Framework: Design Management Strategies to increase the Contribution of Design to Sustainable Goals (Claxton 2016)

6. Conclusions

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The research has shown that a significant majority of fashion brands prioritize sustainability strategies largely associated with the 'materials' and 'production' stages of the circular design approach. However, there is evidence that other aspects of the lifecycle are now being explored and that these include design for durability or longevity, recycling, zero-waste approaches and disassembly.

A key finding was the involvement of different members of the product development teams in implementing sustainability at a tactical level. While organizational size and complexity are known to determine the influence of the designer in fashion businesses, the roles and interactions of the NPD teams with sustainable product development are less well understood. NPD conventionally requires multi-disciplinary teamwork, and the research demonstrates the tendency for leadership roles in sustainability to be taken by technologists, buyers and sustainability specialists. Since progress towards meeting sustainability targets on sustainable materials and processes is largely measured and the measurements are informed by industry-wide initiatives such as SCAP, they, rather than designers, tend to be experts in the management of sustainability. In addition, there is some inconsistency in how improvement actions are reported across the industry, which can lead to skepticism both inside and outside the organization. In this respect, the research highlights the importance of businesses' approaches to reporting improvement actions on the organization's culture and reputation.

The research contributes to the development of design management in the organization by identifying the complexity of NPD processes in fashion organizations, and the importance of raising awareness across the business, engaging designers and building skills and knowledge within design and NPD teams. Although a limited number of designers participated in the research, it supported earlier studies that sustainability is perceived as being too technical, or

not relevant to their role. However, designers were shown to be. more engaged at a strategic level where sustainable strategies for durability are required to achieve product differentiation, and where training had been undertaken to support design decisions. In this last respect, a more informed approach to sustainability by design leaders and their engagement with education and learning, can enhance design's potential influence and contribution to the future of the fashion industry

The most significant limitation in this study was the limited response by designers to the survey, and designer engagement could itself form the basis of further research. Two significant directions for future studies emerged from the findings. In recent years there have been relatively few studies in to the roles and responsibilities of designers in retail and service industries. Given the structural changes in markets caused by digital competition, their influence on the design function in organizations deserves closer attention. In particular, designers and their influence on strategy, whether formally at a senior level or in mediating strategy through praxis in middle management. A second direction concerns the use of sustainable design practices - activities and mindsets - themselves and their application in the fashion industry.

References

Allwood, J., Laursen, S., Malvido de Rodriguez, C., and Bocken, N., 2006. Well dressed? The present and future sustainability of clothing and textiles in the United Kingdom. Cambridge University Institute for Manufacturing, Cambridge UK.

Armstrong, C.M., Niinimaki, K, Kujala, S., Essi Karelli, E., and Lang, C. 2015 Sustainable product-service systems for clothing: exploring consumer perceptions of consumption

alternatives in Finland. J. of Cleaner Production (970), 30-39.

Balch, O., 2013. H&M: Can fast fashion and sustainability ever really mix? The Guardian
http://www.theguardian.com/sustainable-business/h-and-m-fashionsustainability- mix
[Accessed 20/05/15].

Best, K., 2006. Design Management: Managing Design Strategy Process and
Implementation. AVA Publishing, London UK.

Bevilacqua, M., Ciarapica, F., Giacchette, G., and Marchetti, B., 2011. A carbon footprint
analysis in the textile supply chain. Int. J. of Sust. Eng., 4, (1), 24-36.

Bhamra, T., and Lofthouse, V., 2007. Design for Sustainability: A Practical Approach (Design
for Social Responsibility). Gower, Aldershot UK.

Black, S., 2008. Eco-Chic: The Fashion Paradox. Black Dog, London UK.

Borja de Mozota, B. 2002. Design and competitive edge: A model for design management
excellence in European SMEs. Des. Mgt J., 2, 88-103.

Borja De Mozota, B., 2003. Design Management: Using Design to Build Brand Value and
Corporate Innovation. Allworth Press, New York NY.

Borja de Mozota, B., 2006. The four powers of design: a value model in design
Management. Des. Mgt Review, 17,(2), 44-53.

Botticello , J., 2012. Between classification, objectification, and perception:
processing secondhand clothing for recycling and reuse. Textile, 10(2), 164-183.

Braungart, M., McDonough, W., Bollinger, A., 2007. Cradle-to-cradle design: creating healthy
emissions - a strategy for eco-effective product and system design. J. of Clean Prod. 15, (13-
14), 1337-1348.

Bryman, A., 2008. Social Research Methods. Oxford University Press, Oxford UK.

Cachon, G., Swinney, R., 2011. The value of fast fashion: Quick response, enhanced design,
and strategic consumer behavior. J. of Mgt. Sci., 57, (4),778 – 795.

Charter, M., Clark, T., 2007. Sustainable innovation: Key conclusions from sustainable innovation conferences 2003–2006, organised by The Centre for Sustainable Design. University for the Creative Arts.

Charter. M. 2018. Circular economy innovation and design. In M. Charter (ed.) Designing for the Circular Economy. Routledge: Abingdon, UK

http://bic-innovation.com/static/bic/knowledge_base/documents/T160433.pdf. [Accessed 06/05/15].

Chapman. J. 2015. Emotionally Durable Design: Objects, Experiences and Empathy. 2nd ed. London: Routledge.

Cooper, R., 2012. Design leadership in a vortex of change. Des. Mgt. J., 7(1), 3-5.

Cooper, T., Claxton, S., Hill, H., Holbrook, K., Hughes, M., Knox, A. and Oxborrow, L., 2013. Development of an industry protocol on clothing longevity. Report produced for Waste and Resources Action Programme (WRAP). Nottingham Trent University, Nottingham UK.

Cooper, R., and Press, M., 1995. The Design Agenda: A Guide to Successful Design Management, John Wiley, Chichester UK.

Corvellec, H. and Stål, H.I. 2017. Evidencing the waste effect of Product-Service Systems (PSSs). J.of Cleaner Prodn., (145), 14-24.

Creswell, J., 2013. Qualitative enquiry: Choosing Among Five Approaches. Sage, London UK.

Creswell, J., and Clark, V., 2011. Designing and Conducting Mixed Methods Research. Sage, London UK.

Curwen, L., Park, J., and Sarkar, A., 2012. Challenges and solutions of sustainable apparel product development: A case study of Eileen Fisher. Clothing and Textiles Research Journal, 31(1):32-47.

DeLong, M., Goncu-Berk, G., Bye, E., and Wu, J., 2013. Apparel sustainability from a local perspective. Research Journal of Textile and Apparel, 17(1): 59-69.

Earley, R., 2017. Circular design futures. The Design Journal, 20(4): 421-434.

Early, R., and Goldsworthy, K., 2018. Circular textile design: Old myths and new models. In M. Charter (ed.) Designing for the Circular Economy. Routledge, Abingdon UK.

ECAP. (2019). Driving circular fashion and textiles. (Report). Available at: https://www.wrap.org.uk/sites/files/wrap/ECAP/Summary-Report-202019-20-Driving-circular-fashion-and-textiles_.pdf. [Accessed 06/01/20]

Ellen MacArthur Foundation, 2017. New textiles economy: redesigning fashion's future. Ellen MacArthur Foundation. https://www.ellenmacarthurfoundation.org/assets/downloads/publications/A-New-Textiles-Economy_Full-Report_Updated_1-12-17.pdf. [Accessed 03/06/19].

Egels-Zandén, N., Hulthén, K., and Wulff, G., 2015. Trade-offs in supply chain transparency: the case of Nudie Jeans. J.of Cleaner Production (107), 95-104.

Epstein, M., Roy, M.-R., 2003. Improving sustainability performance: Specifying, implementing and measuring key principles. J. of Gen. Mgt, 29, (1), 15-31.

European Commission, 2012. Eco design your future: How eco design can help the environment by making products smarter. European Union, Brussels, Belgium.

Faludi, J. 2017. Recommending sustainable design practices by characterising activities and mindsets. Int. J. of Sust. Des. 3(2), 100-136.

Fletcher, K., 2007. Sustainable Fashion and Textiles: Design Journeys. Earthscan, London UK.

Fletcher, K., Grose, L., 2012. Fashion and Sustainability: Design for Change. Laurence King, London.

Fletcher, K., 2012. Durability, Fashion, Sustainability: The Processes and Practices of Use. Fashion Practice. 4, (2), pp. 221–238.

Ginetex, n.d. Clevercare: How to reduce climate impact, effort and money caring for fashion the clever way. http://www.clevercare.info/en. [Accessed 20/05/15].

Global Fashion Agenda, 2019. Pulse of the Fashion Industry, 2019 Update. Global Fashion Agenda, Boston Consulting Group, Inc. and Sustainable Apparel Coalition. Available at https://globalfashionagenda.com/pulse-2019-update/#. [Accessed 20/04/20].

Goworek, H., 2010. An investigation into product development processes for UK Fashion retailers: a multiple case study. J. of Fash. Mkting and Mgt, 14(4), 648- 662.

Gwilt, A., 2014. A Practical Guide to Sustainable Fashion. AVA Publishing, London, UK.

Gwilt, A., Rissanen, T., (Eds.), 2010. Shaping Sustainable Fashion: Changing the Way we Make and Use Clothes. Earthscan, London UK.

Hands, D., 2011. Design transformations: measuring the value of design. In R. Cooper and S. Thomas (eds.). The handbook of Design Management. Bloomsbury, London UK.

Hands, D., 2017. Vision and values in Design Management. Bloomsbury: London UK.

Harris, F., Roby, H., and Dibb, S. 2016. Sustainable clothing: challenges, barriers and interventions for encouraging more sustainable consumer behavior. Int. Jnl of Con.Studies, 40, (3), 309–318.

H&M, n.d. More sustainable materials: cotton.

http://about.hm.com/en/sustainability/sustainable-fashion/materials.html [Accessed 20/05/15].

Holland, R., Lam, B., 2014. Managing Strategic Design. Palgrave: London UK.

Huang, H., Liu, Z., Zhang, L., Sutherland, J., 2009. Materials selection for environmentally conscious design via a proposed life cycle environmental performance index. Int. J. of Adv. Man. Tech., 44, 1073-1082.

Kirchherr, J., Reike, D., Hekkert, M., 2017. Conceptualizing the circular economy : An analysis of 114 definitions. Resources , Conservation & Recycling, 127, 221–232.

Lawless, E., Medvedev, K., 2016. Assessment of sustainable design practices in the fashion industry: experiences of eight small sustainable design companies in the Northeastern and Southeastern United States. Int. J. of Fash. Des., Tech. and Ed., 9, (1), 41-50.

M&S, 2014, Plan A report 2014.:

http://planareport.marksandspencer.com/downloads/M&S-PlanA-2014.pdf [Accessed 20/05/15].

M&S, 2015, Plan A Report 2015.

http://planareport.marksandspencer.com/M&S_PlanAReport2015.pdf [Accessed 19/05/15].

Laitala, K., Boks, C., Klepp, I., 2011. Potential for environmental improvements in laundering. Int. J. of Cons. Studies, 35, (2), 254 – 264.

Maxwell, J., 2013. Qualitative Research Design. Sage, London, UK.

McColl, J., Moore, C., 2011. An exploration of fashion retailer own brand strategies. J. of Fash. Mkting and Mgt: An Int. J. 15, (1), 91 – 107.

McDonough, W., Braungart, M., 2009. Cradle to cradle: remaking the way we make things. Vintage, London UK.

McQuillan, H., 2010. Zero waste design practice. In A. Gwilt and T. Rissanen (eds.) Shaping Sustainable Fashion: Changing the Way we Make and Use Clothes. Earthscan, London, UK. pp 83-97.

Miller, K., Moultrie, J., 2013. Delineating Design Leaders: A Framework of Design Management Roles in Fashion Retail. Creativity and Inn. Mgt., 22,(2), 161-176.

Moultrie, J., n.d. From eco- to sustainable design. University of Cambridge Institute for Manufacturing: Cambridge, UK. http://www.ifm.eng.cam.ac.uk/research/dmg/ecosusdesign/ [Accessed 30/04/15].

Mugge, R., Schoormans, J.P., Schifferstein, H.N., 2005. Design strategies to postpone consumers' product replacement: The value of a strong person-product relationship. The Des. J., 8(2), 38-48.

Niinimaki, K., and Hassi, L., 2011. Emerging design strategies in sustainable production and consumption of textiles and clothing. J. of Cleaner Production 19(16):1876-1883.

NIKE, 2014. Comparative product lifecycle assessment: NIKE Inc., Product Comparisons. http://www.nikeresponsibility.com/report/uploads/files/Product_LCA_Method.pdf. [Accessed 18/05/15].

Palomo-Lovinski, N., Hahn, K., 2014. Fashion design industry impressions of current sustainable practices. J. of Fash. Pract. 6(1), 87-106.

Patagonia, 2009. The footprint chronicles: Methodology for environmental cost calculations. https://www.patagonia.com/pdf/en_US/method_for_cost5.pdf [Accessed 18/05/15].

Pedersen, E.R.G., Earley, R., Andersen, K.R., 2019. From singular to plural: Exploring organizational complexities and circular business model design. Journal of Fashion Marketing and Management: An International Journal. https://doi.org/10.1108/JFMM-04-2018-0062 [Accessed 20th June 2019]

Pitsaki, I., Rieple, A., 2013. Design in strategy: the case of cultural organizations. Proceedings of the Cambridge Academic Design Management Conference, University of Cambridge, UK.

Ruppert-Stroescu, M., Hawley, J., 2014. A typology of creativity in fashion design and development. J. of Fash. Pract., 6(1), 9–36.

Sandvik, I.M., Stubbs, W., 2019. Circular fashion supply chain through textile-to-textile recycling. Journal of Fashion Marketing and Management: An International Journal, https://doi.org/10.1108/JFMM-04-2018-0058

Schifferstein, H.N., Mugge, R., Hekkert, P., 2004. Designing consumer-product attachment. In: D. McDonagh, P. Hekkert, J.V. Erp, D. Gyi (Eds) Design and Emotion. Taylor & Francis: London, UK, 378-383.

Sinkovics, N., Ferdous Hoque, S., Sinkovics, R.R., 2016. Rana Plaza collapse aftermath: are CSR compliance and auditing pressures effective. Accounting, Auditing & Accountability J. 29(4), 617-649.

Stål, H.I., Jansson, J., 2017. Sustainable consumption and value propositions: Exploring product–service system practices among Swedish fashion firms. Sust. Dev., 25, 546–558.

Stål, H.I., Corvellec, H. 2018. A decoupling perspective on circular business model implementation: Illustrations from Swedish apparel. J. of Clnr Prodn., 171, 630-643.

Topalian, A., 2014. In conversation with Alan Topalian [podcast], Cambridge Academic Design Management Conference. https://www.youtube.com/watch?v=J9wAJc1ZZA8 [Accessed 15/01/15].

United Nations, 2016, Sustainable Development Goals.

http://www.undp.org/content/undp/en/home/sustainable-development-goals.html. [Accessed 11/09/16].

Weerts, K., Vermeulen, W., Witjes, S. 2018. On corporate sustainability integration research: Analysing corporate leaders' experiences and academic learnings from an organizational culture perspective. J. of Clnr. Prodn., 203, 1201-1215.

WRAP, 2012. Valuing Our Clothes: The Evidence Base [online]. Available at:

http://www.wrap.org.uk/sites/files/wrap/VoC%20FINAL%20online%202012%2007%2011.pdf [Accessed 28/04/15].

WRAP 2014. SCAP 2020 Commitment [online]. Available at:

http://www.wrap.org.uk/content/scap-2020-commitment [Accessed 30/04/15].

WRAP 2015. WRAP's response to the European Commission's Circular Economy package. [online]. Available at: http://www.wrap.org.uk/blog/2015/12/wrap%E2%80%99s-responseeuropean- commission%E2%80%99s-circular-economy-package. [Accessed 12/09/16].

Table 1

FASHION BUSINESSES' LEVEL OF ENGAGEMENT IN SUSTAINABILITY				
	IDEAL	**ADAPT**		**ADOPT**
		EARLY	**LATE**	
Company	**A:** Large UK high street brand **B:** Mid-market Scandinavian	**D:** UK Supermarket clothing brand with US parent company	**G:** UK Department store with own brand clothing line	**J:** UK designer niche brand / manufacturer with an integrated sustainability

	fashion brand with fast fashion parent company **C:** US mid-upper market women's fashion brand	**E:** UK Supermarket clothing brand. **F:** UK mid-upper market fashion brand	**H:** German premium fashion brand	concept
Environmentally sustainable design strategies	Environmentally sustainable fibers and processes strategy with clear targets Design for durability Large innovation projects: e.g. working	Environmentally sustainable fibers and processes strategy with clear targets Small innovation projects: e.g. design for disassembly, recycled fibers	Environmentally sustainable fibers and processes strategy (targets may not be set or publicly communicated)	Environmentally sustainable fibers and processes strategy. Recycled pre and post-consumer waste yarn Design for durability

	towards closed loop recycling			
	Investigating new business models such as renting			
Other sustainable criteria	Clothing take-back schemes. High level of transparency in external communication of sustainable brand values, strategies and targets. Progress	External communication of strategies and targets is less comprehensive and transparent - may not include progress / achievements.	External communication of strategies and policies is limited and may not identify targets.	Local production Integrated marketing strategy: sustainability is central to all communications (website, blog, articles).

	towards targets is communicated.			

Table 2

Awareness of purpose/value of sustainability strategy and plan.	Ensure full understanding of business sustainability strategy and plan. Aim for design to be represented in strategy setting at the highest level possible.
Integration of design function into business strategy.	Ensure that the design strategy is aligned with business sustainability strategy. Engage with collaborative platforms, conferences and management training to identify opportunities for integrating design teams into sustainability strategies.

Awareness and understanding of potential sustainable design approaches.	Train designers in a wider range of sustainable design approaches than materials and processes. Utilise internal and external training resources (e.g. WRAP and SAC workshops, closed loop design principles, Cradle to Cradle) to raise awareness in design teams.
Understanding of how design can contribute to these processes.	Utilise designers' knowledge of the customer and market to generate new thinking and sustainable solutions that offer competitive advantage through product and / or brand differentiation (e.g. considered / durable design, sustainable collections marketed to appeal to customer values and identity).
Qualities of the tools and methodologies for sustainable design.	Develop and adapt appropriate design tools to assist designers in sustainable approaches that are relevant to the brand, market and product: e.g. a pro-forma of questions for suppliers, a sustainable design module based on the SAC or WRAP sustainable design tool.
Awareness of purpose / value of budgetary allocation and control.	Develop a business case for allocating budget to training and upskilling the design team in sustainable design approaches.
Allocation of adequate budgets to sustainable design.	Prioritize time and budget for training and development of design staff. Maximise cost neutral opportunities to engage in knowledge sharing and training through participation in funded government projects, collaborative industry platforms and academic projects.

Skills for effective design activity.	Recruit / train designers in basic textile knowledge of fibers, sustainable alternatives, sustainable processing and chemicals used in manufacturing in relation to their job role and product focus.
Development of cross -functional and multi-disciplinary working.	Encourage a pro-active approach for designers in proposing ideas and solutions for sustainably designed products within the NPD team and with suppliers. Identify and appoint sustainability champions who can raise awareness within the design team and across the wider NPD team.
Support of senior management for sustainable design.	Communicate and demonstrate the design team's contribution to, and achievements in, sustainability within the organization.
Attitudes to design throughout the organization.	Demonstrate the wider potential application of design skills in sustainability in order to avoid stereotypical perceptions.