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# **A STUDY ON THE DEVELOPMENT OF SUSTAINABLE ORGANIC CLOTHING FOR WOMEN'S WEAR USING NATURAL FIBRES WITH SPECIFIC FOCUS ON PRODUCT SERVICEABILITY**

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Organic natural fibres have shown potential for women's wear products. A recent research (Niinimaki, 2010) highlighted that performance; durability and longevity of products made from natural fibres were some of the concerns for eco-conscious consumers. Organic natural fibres have less impact on environment and ecosystem and garments made of such materials were expensive compared to synthetic fibres due to its eco credentials. However, consumers were aware that man-made fibres in comparison to natural fibres outperform in areas relating to care, maintenance and durability. According to Ticolau (2010) and Gam (2011) eco-conscious consumers evaluate the cost of any garment against its durability and performance and expect garments produced from natural fibres superior to man-made garments. Majumdar et al, (2010) explored the functional properties of natural fibres, where organic fibres were made into knitted fabrics and assessed both comfort and durability. The above study successfully produced fabrics with low heat loss properties and better comfort value but the durability of the fabric was not reported. As highlighted by Gam (2010), the fabric was an important factor in the purchase of eco-friendly clothing but consumers require product serviceability qualities, such as strong aesthetic appeal, performance and comfort; which many eco-friendly garments do not provide.

Previous research also highlighted that natural fibre blends like cotton, bamboo and banana leaf fibres in garments. In this study, the authors report the significance of organic sustainable clothing for women's wear particularly in the UK, in the context of the current trend, design and pattern. Based on the recent explorations on silk and other organic fibre blends with its collaborators, the authors highlight the potential commercial opportunities in the UK in the context of the women's wear market promoting eco-friendly and sustainable fashionable clothing which meets various pre-requisites such as durability, care and maintenance and comfort.

**Key words:** Natural fibres, organic clothing, sustainability, longevity, garment serviceability

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## **Introduction**

The global textile industry is reported to be the most unsustainable; it produces large amounts of waste and discharges into the industry. For example, cotton crops alone consume 24% of the total pesticide used globally (Quinn, 2010). This causes a serious impact on the environment. In relation to fashion, the forecasting process and the continual updating of trends, some of the contributing factors are an increase in product lines and subsequently causes drain on resources; including dyes and chemicals which are discharged into the environment. Subsequently, this affects quality and due to the fast fashion trend, garments lose their face value and usable life much earlier than expected. In light of these detrimental factors, organic natural fibres had shown potential for the women's wear market. Yarn Expo 2011, Beijing, an exhibition which focused on sustainable materials, reported that there was a significant demand for sustainable organic fibres such as cotton, bamboo, flax, and ramie (Ecotextile, 2011). However, performance of garments made of new organic blends such as bamboo and soya, are yet to be documented. In this context, the current paper proposes to investigate the benefits of clothing made of organic natural fibres which offer product serviceability qualities such as durability, longevity and aesthetic appeal. The popularity of organic clothing has increased in the last decade or so, particularly due to continuous change in consumer lifestyle and increasing awareness of organic produce launched by many major retailers and supermarkets. Consumers are willing to pay more if organic clothing offered durability and longevity.

Researchers from UK collaborated with its Indian group to source various organic blends and investigate the longevity of sustainable organic clothing and evaluate performance, forecast trend design, and ascertain product longevity and sustainability for a women's wear range based in the UK. The approach was made plausible due to a recent memorandum between the authors' institution and various Centres of Excellence (CoE) across India and leading textile institutions.

## **Background and rationale**

Organic fibres that are produced under a natural process without the use of any artificial methods or chemicals are getting more and more attention especially in the clothing and fashion industry. A recent report from the ICAC Recorder (2009) highlighted that India, China and Syria were the highest producers of **organic**

**cotton.** In addition, the use of organic cotton by major brands such as Marks and Spencer and Timberland had increased in the recent past. The Soil Association reported that retail sales using organic clothing and textiles reached £100 Million, which was a 40% increase in sales and is a tenfold increase since 2002 (The Soil Association, 2011). The Soil Association is a charity organisation that promotes and develops sustainable approaches to food, farming and other products and is one of the oldest organisations which certifies 80% of produce to Global Organic Textile Standards (GOTS) an international standard from field to final finished product. **Sustainable products** using environment friendly farming methods preserve an ecological balance thus avoiding depletion of natural resources are gaining momentum in fashionable clothing particularly in the UK.

In today's age, garments are produced too quickly that are easy to care for and maintain and equally lose their face value. Usually, these garment are trend driven and disposed quickly by consumers, mainly for the loss of aesthetic appeal rather than its functional purpose. Hence, consumers tend to dispose clothing within a short span of time. In the US, according to a report on Municipal Solid Waste, the longevity of textiles was an issue for waste disposal. Clothing was classified as non-durable and it generally lasted less than three years (US Environmental Protection Agency, 2010). **Longevity of clothing** also has a major influential impact on clothing retailers who frequently supply fast fashion garments which positively increases their sales. However, according to the Carbon Trust, UK (2011) long lived clothes offer an opportunity to reduce emissions associated with clothing over a long term basis. Carbon Trust, in its report stated that a shirt lasting six months will need to be replaced twice a year; doubling the embodied emissions over the year compared to a longer lived shirt that lasts for 50 cycles. The report also stated that by reducing the useful life of clothing from one year to one month increases the emissions over the year by 550%.

DEFRA (2004) in its report on fibre use in clothing stated that 58% of fibres used globally in clothing were synthetic fibres. Among synthetic fibres, polyester accounted for 77% followed by other fibres such as Nylon (9%), Acrylic (6%) and 7% cellulosics. In terms of natural fibres, 28% of cotton was used in clothing globally. Hence cotton and polyester were fibre dominants globally. Other natural fibres which are used in clothing were, 10% Jute, 4% wool, 4% flax and 4% other fibres (silk,

kapok, hemp). Recently a number of **natural fibres** such as bamboo, soy, corn, banana and pineapple fibre blends were introduced. Mukhopadhyay et al., (2009), reported that natural fibres such as **banana fibres**, (a bast fibre obtained from the pseudostem of the banana plant) had good mechanical properties. The breaking strength of fibres for lower linear density fibres (0.25 – 0.98 tex) was better than higher diameter fibres (3.0 to 7.0 tex), the authors noted that fine fibres had better structure and further added that the mechanical properties of fibres were affected by a natural variation in plant and processing stage. Yueping et al.,(2010) based on their extensive analysis on fibre morphology reported that **bamboo fibre** (degree of crystallinity) was similar to that of jute. The cellulose matter of bamboo fibre consisted of 73% cellulose, 10% lignin and 12% hemicellulose.

These fibres were popular in Summer/Spring clothing ranges. In addition, a wide range of animal fibres such as angora, alpaca, llama, vicuna, cashmere and mohair were also popular in winter clothing where thermal comfort was required. Ticolau (2010) and Gam (2011) stated that eco-conscious consumers evaluated the cost of any garment against its durability and performance and therefore expected garments produced from natural fibres to be superior to man-made garments. Eco-conscious consumers also rely on fabric performance and preferred product serviceability such as comfort and appeal which most eco-friendly garments do not provide (Gam, 2010). Ninimaki (2010) also highlighted the importance of performance, durability and longevity of products made from natural fibres.

The term green fashion is also gaining momentum in the high street, mainly focusing on the industry to clean up its act in relation to conditions of manufacturing, fair labour policies and environmentally responsible actions. Hence, green fashion is placing an emphasis on **Corporate Social Responsibility** for the industry to adopt. Recently, the Director of Young British Designers Debra Hepburn suggested that a new evolution had begun with ethical and moral values, as to how industry conducts itself towards the environment and people; with transparent practices that produces brands that are genuinely honest and ethically sound within their values. She also added that it all started with recycled materials; however designers are now increasingly focussed to sharing ideas and practice in sustainable production (The Ecologist, 2011).

Espirit launched 'ECollection' using organic cotton with natural colours which initially was an overwhelming success but soon consumers desired more colourful clothes (Myers and Stolton, 1999). In recent times, a number of initiatives were carried out by leading brands such as Patagonia, NIKE and Puma on the production of sustainable organic garments. In the UK, NIKE was a lead member of the sustainable clothing action plan group launched in February 2009 (London Fashion Week's Sustainable Fashion Show) which addressed the elements of reuse, recycle, development and use of sustainable fibres (NIKE, 2009). Similarly, a campaign by manufacturer/retailer Patagonia, an outdoor clothing provider in the US has an encouraging common threads initiative to reduce, repair, reuse, and recycle whilst also stated that outdoor gear is designed to last long (Patagonia, 2011). Although some initiatives were carried out by major brands it appears that more of such initiative will be required if consumers can make suitable decisions on sustainable organic clothing particularly for low - middle market.

The primary aim of the project is to propose a strategic approach for the manufacture of sustainable clothing made of organic natural fibres which offer product serviceability such as durability, a long lasting life and aesthetic appeal. A collaborative approach is proposed between UK and Indian research groups as highlighted in Figure 1. The organic materials sourced from India, such as cotton, bamboo, banana and jute, produced without the use of pesticides and chemicals and coloured using organic dyes will be evaluated for durability and performance. In addition, sample garments designed for the UK market will be evaluated for sustainability and longevity. During this process, consumer perspectives on garments produced using organic natural fibres will be evaluated by the researchers in India.

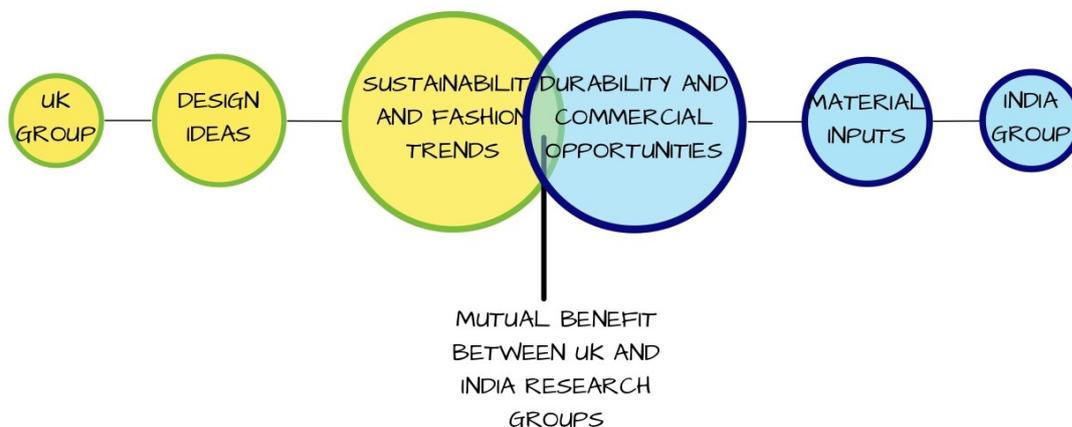
## **Discussions**

According to Mintel (2009) in the UK, consumer awareness and concern with issues such as sustainability and ethical production is higher than ever. The ethical clothing market is worth around £175 million, major players such as Marks and Spencer, H & M, Topshop, Sainsbury's, Tesco and others increased their product ranges which increased their sales exponentially. The barriers to the purchase of ethical clothing are that prices are high and there is a lack of availability in terms of product ranges.

In addition, consumers are not clear about various complex terms used, such as ethical clothing, fair-trade, organic fabric, sustainable garment, etc. There is also lack of trust in labelling. In addition, consumers choose quality and long term economy against quantity when making a sustainable choice. It was reported that organic clothing should be fashionable and stylish ranges appealing to a wider demographic. The report also stated that 35% of consumers do not have an interest in ethical fashion, 23% said they would buy clothing, if they could afford it; 20% said products were not easily available, 10% stated products were expensive; and 11% reported that they do not believe clothing was genuinely ethically made.

In addition to these, authors evaluated the project in the context of the women’s wear market for the UK, taking into consideration trend and design. It is proposed that the strategic plans will be implemented using support obtained from a commercial collaboration based in India and UK.

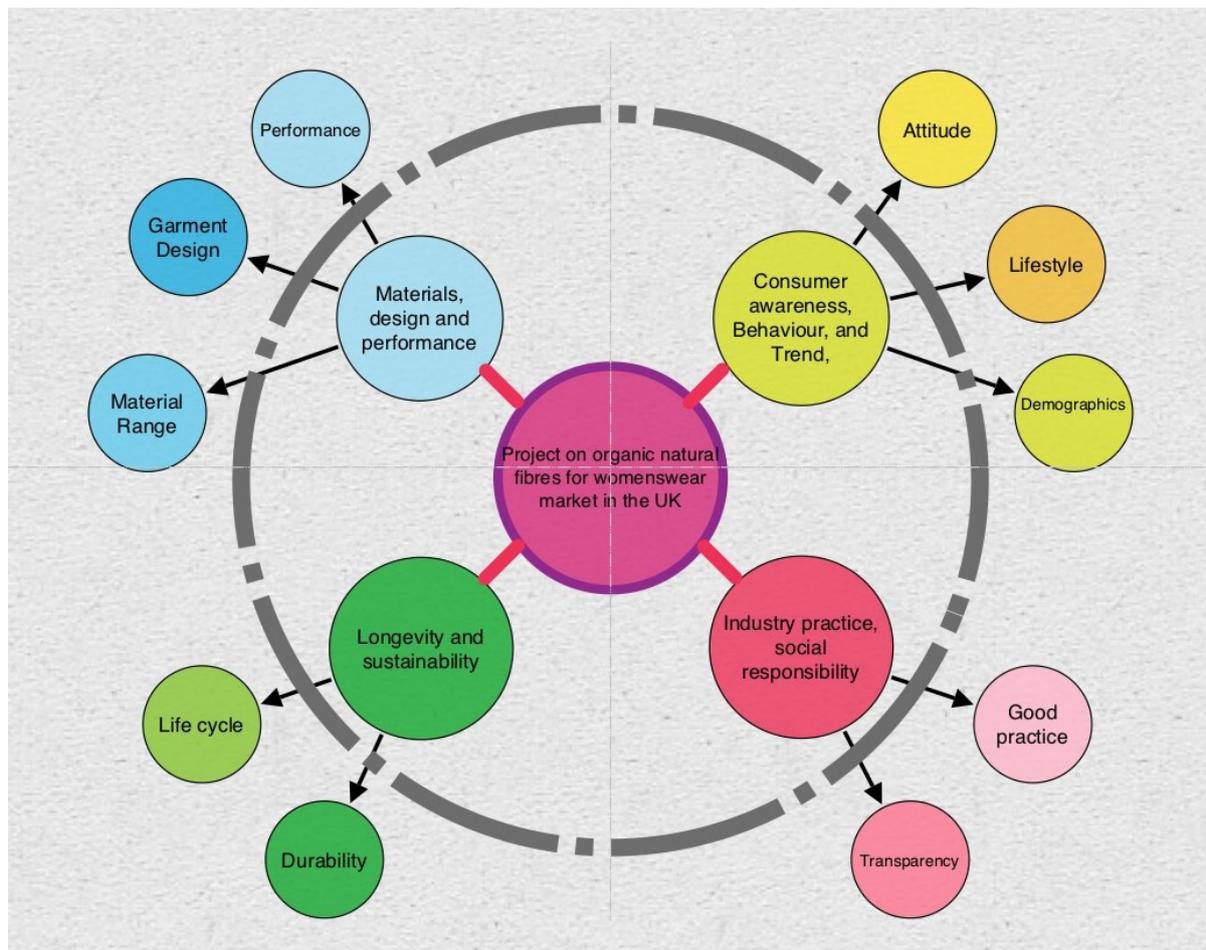
A COLLABORATIVE PROJECT ON LONGEVITY AND SUSTAINABILITY OF ORGANIC CLOTHING



**Figure 1 A collaborative approach to investigate factors influencing longevity and sustainability of organic clothing**

Based on the recent explorations with organic fibre blends, the authors highlighted the potential commercial opportunities in the UK, in the context of the women’s wear market promoting eco-friendly and sustainable fashionable clothing which meets various pre-requisites such as durability, care, maintenance and comfort. Various influential factors (Figure1) were also identified. These were divided into four sections as:

1. Materials, design and performance
2. Consumer awareness, behaviour and trends
3. Industry practice and social responsibility
4. Longevity and sustainability of garments



**Figure 2: Significant factors influencing the production of sustainable women's wear using organic natural fibre with enhanced longevity**

## Materials

Recently as highlighted in the previous section, a plethora of organic materials continues to evolve in the market such as cotton, silk, hemp, jute, bamboo, pineapple, soya, etc. However, the availability and accessibility of materials is of great concern for garment manufacturers and fashion designers. The characteristics and performance of these new materials/blends are yet to be ascertained in the

context of fashionable garments particularly for women's wear markets such as dress materials.

### **Product performance**

Consumers who wish to purchase organic clothing tend to focus on the garment performance and are expecting reasonable performance, as most garments are priced accordingly. The industry stresses the fact that individual garments are expensive, but it has less impact on the environment. The desirable serviceability features of organic products are aesthetics, durability, care and maintenance of the garment during its use.

### **Product design**

The complex phenomena of niche eco-garment design, which emphasises sustainability in the product development process and includes elaborate customer profiling may pose a challenge to large retailers who respond to mass market demand with the supply of quick turnaround and disposable garments (Beard & Hartmann, 1997; Niinimaki and Koskinen, 2011). Therefore, many large retailers may have to amend their design practices in order to accommodate the eco consumers' requirements such as, the considerations of fabric composition/performance and garment construction techniques as part of the initial design process (Niinimaki & Hasi, 2011). Gam et al, (2009) approached the design process by combining technology with traditional methods of production. The study using organic cotton also highlighted the importance of communication and the monitoring of the product at every stage, from fibre sourcing to garment sampling and assessment. The study successfully concluded with the garments costing relatively the same as the non-organic cotton ones. Armstrong and LeHew (2011), also presented the case for more sustainable design practices by challenging traditional methods of sequential, inflexibility processes; that start directly with sustainable influences, which are continually communicated and practiced at each stage, re-assessed and refined; so that the consumer can distinguish and understand the value of the product. Amsterdam Fashion Week - Green Fashion Competition (ecouterre, 2011) and London Fashion Week's Estethica ([www.londonfashionweek.co.uk](http://www.londonfashionweek.co.uk), 2011), regularly promotes established and new ethical fashion designers, with the shared message that fashion and ethical trading

work together with ease, and sustainability should not hinder the variety of styles available to the consumer.

### **Industry practice**

Corporate Social Responsibility allows the retailer to provide a long-term ethical plan which is eco-friendly and consumer conscious. However, finding the balance between minimising environmental impact and investing in resources that provides consumers with products that perform on a comparable scale to those of man-made or synthetic products requires a more strategic approach. Using this approach may continue to address the needs of consumer and attract a new demographic group in order to improve/maintain profits, brand loyalty and consumer confidence (Carrigan & Pelsmacker, 2009). Companies therefore, need to be aware of the pitfalls between internal and external communications and of the messages imposed on the wider community; as non-substantive ethical claims have often been exposed and the need for complete transparency is essential. Therefore to have strong ethical values companies should consider their internal infrastructure to embed a shared ethical philosophy. However, Stuart (2010) suggests that hierarchical structure can often be problematic due to the differing communication channels. Often this is more complex for companies with corporate social responsibility policies who need to ensure a cohesive approach to planning and implementation of such policies. Thereby, avoiding conflict between business and the consumer which could affect their brand values and profit (Stuart, 2011). Successful case studies of Corporate Social Responsibility consider many sustainable options in relation to the global supply chain and disseminate information clearly. Thus, providing the consumer with a comprehensive understanding of the product and therefore giving them the conscious decision to satisfy their personal values and beliefs; which can greatly influence the consumers purchasing decisions (Mirvis, 1994; Gowerek, 2011; Moran, 2009). There have been many companies who had questioned the processes within the global supply chain and exchanged those that do not comply with their environmental messages for those that do. Using such a refined programme of production, which is clear transparent and consumer focussed endorses the message of exclusivity, has resulted in the increased cost of the product (Mirvis, 2010). The development of key messages which are embedded in company culture

prior to public knowledge are essential therefore, educating the public to change their shopping habits was a great challenge for retailers (Beard, 2008).

It could therefore be argued, that governmental involvement/initiatives (Defra, OECD) that encourage sustainable activities, i.e. recycling, energy efficiency, etc, have made consumers more socially responsible and aware of the effects on the environment. The encouragement to act sustainably responsible in day-to-day life is filtered down through different communication channels but sometimes the information only provides the solution but not the reason for the action. Gowerek (2011) suggested that governmental support agencies could play a more significant role in the promotion of ethical trading as lack of consumer literature discourages the purchase of ethical clothing. It would also be advantageous for governments to actively invest in eco/sustainable practices in order to influence and encourage consumers to purchase ethical goods as this could benefit economic growth (Choo & Krasser, 2006). Therefore, the case for the simplification of the different 'eco labelling' systems, such as Fairtrade, GOTS, etc., is strong. The labelling systems often confuse consumers, as each represents a different ethical process within the global supply chain. Therefore the system would benefit from some transparencies regarding processes in order to improve consumer confidence (Koszweska, 2011).

### **Consumer awareness among women**

According to Mintel (2011) there is a rising trend in female consumers purchasing better quality clothing, that offer more durability and longevity; the ethical clothing market which is currently valued at £175 million; indicates that there is potential to offer consumers sustainable and exclusive clothing range. In contrast, fast fashion had offered disposable, low quality products at affordable prices, making this a popular choice for consumers and encouraging high consumption and the rise in ethical re-use practices. Ethically, reuse practices have been widely acknowledged and accepted in contemporary society (Doran, 2009). The garment's identity, i.e. garment construction, country of origin, fabric composition is clearly presented to the consumer and the important factors and considerations are the reuse purpose, i.e. disassembly, remake, etc. (Dickson, 2000). Doran (2009) suggested that the ethical global supply chain is often too complex for consumers to understand and those who understand the processes involved are often most likely to purchase ethical clothing.

Ethical consumers often assess such practices according to their personal values and align them according to their understanding of sustainability. The consumer who does not purchase sustainable clothing may do this because of the cost, a misunderstanding of ethical issues or simply because the alternative options are cheaper (Moran, 2009). Despite this, purchasing behaviour are clearly embedded in the consumers psyche, the decision to purchase must fulfil their individual requirements but the need to satisfy the physical and psychological demands are high; whether they are ethical consumers or not. Cross-generational studies suggested that consumers are united in supporting fair and ethical trade but their individual needs and societal beliefs are deterrents against the value and cost of the goods. However, consumers who purchase ethical goods on a regular basis have an understanding of how this benefits themselves and the global supply chain (Cheah and Phau, 2011). Hustvedt and Dickson (2009) highlighted a significant link between product understanding and purchase intentions, suggesting that consumers who purchase non-apparel organic products are likely to be aware of popular types of organic fibres in clothing and are able to purchase such clothing with a dress of confidence in the product. Understanding the consumers' requirements is essential when using organic fabrics in clothing; of equal importance are the aesthetic qualities and product serviceability such as function and durability. Most retailers offering this type of product are either niche or specialist clothing companies providing garments for loyal customers who are willing to not only invest in the quality of the garment but also the companies brand values (DeLong, 2009; George, 2009). With regards to product serviceability consumers often link the perceived value of ethical garments to the price and expect them to perform to the same or higher standard than their man-made counterparts (Hustvedt and Dickson, (2009). Function, aesthetics, performance and the aftercare of ethical garments are important to consumers as they pay more for such garments. In addition, to these qualities they also want exclusive aesthetic qualities and expect the cost of the garment to represent the ease of aftercare (H-Brookshire and Norum, 2011).

### **Strategic approach**

The paper had highlighted that several factors influencing the sustainable organic clothing (Figure 1). Among them the availability of materials, performance, consumer awareness and behaviour, industry practice and initiatives to promote organic

material were pivotal to the evolution of sustainable garments. Ethical clothing companies generally use organic cotton for their clothing range. Understanding the properties of the fibres, their overall performance and value that it adds to the useful life of garment enhances the popularity of the fibre. The use of bamboo is also prevalent in clothing although is not as popular as organic cotton. Some major fashion retailers have recently designed ranges using organic silk, with designs that clearly follow their company philosophies for ethical and well-designed clothing; that have additional aesthetic qualities to distinguish them from their main range. However, the ranges are limited and expensive. This research project, hopes to highlight that organic clothing can be comparable in performance in the context of durability, maintenance and life of product. A wide range of garments in the form of tops, trousers, blouses, tailored suits, jackets, etc are proposed for low, middle and high market levels taking into account the range of demographics. A consumer survey will also be undertaken in the UK and India to determine demand and potential for organic fashionable product and what the consumer understands and expects from such products. Research suggested that women are most likely to purchase organic clothing for themselves as well as for family members, therefore a range of womenswear will be designed and produced in the UK, utilising organic fabrics whereby wearer trials and laundering will determine the outcome, the product development process will involve the use of technology as well as traditional methods to determine the viability of such products.

### **Conclusions and proposed work**

Organic fibres had shown potential for clothing, however its longevity and sustainability for various range of garments are yet to be ascertained. Various researches pertaining to material performance, product design, consumer awareness and industry practice were presented. The paper also highlighted the consumer involvement in organic fashion clothing is complex and the decision making process was not clear, however, these complexities are not prevalent in non-organic purchases. Organic clothing has potential within fashion, however, retailers have only committed these fabrics to basic range and niche stores prefer to use organic cotton and recycled fabrics. Establishing what consumers require is essential but how can they be convinced to purchase organic clothing is what the current project proposes investigate. A transparent and open approach will be

required to make sure consumers aware of the organic method of processing materials and techniques used in the manufacture of organic clothing. This will be implemented throughout the work and consumer behaviour and trend data from previous reports will be used to design and develop product range such that it meets a wide range of demographics and market levels. Finally, the garments assessed for its performance from laboratory tests to wearer trials to ascertain its performance in terms of longevity. The project will aim to investigate and gather evidence to the fact that organic clothing for womens wear have potential such that its longevity and sustainability is comparable to non-organic clothing which loses its face value and aesthetic appeal within a short span. In addition, the project will also be informed by its experience from its collaboration with its researchers and industry partners from India. Based on this experimentation, the project will propose the commercial opportunities for its collaborators from India to work various products for womens' wear market in the UK.

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