Review on the New Prospects for Textiles and Clothing Industry

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Abstract

This paper looked into the new concepts and changes that may take place if we think and search for a new techniques and ways to produce and use our clothes, used different types of fibres, change the conventional farming practices, and wash our clothes in a different way. It attempts to highlight what might happen if the traditional textile industry and clothing sector changed.

KEYWORDS: toxic chemicals, pesticides and fertilizers, bio-fibres, synthetic fertilizers, nanotechnologies, biosciences.

INTRODUCTION

Our quality of life depends on natural resources and the environment; they are the foundation of life. If we use and manage them in a sustainable way, they will continue to meet our needs for energy, food, minerals, fresh water, clean air and fertile soils, all of which are essential to enabling us to continue to grow and prosper.

Achieving a green economy involves transforming what we produce and how we produce it, responding to changes in both supply and demand. We need a balanced and environmentally sustainable economy to support strong business investment and new opportunities, to ensure flexibility to long-term challenges.

To enable this shift to stronger economy, business and consumers must take advantage of the benefits of resource efficiencies. All sectors of the economy need to grow with less environmental impact and greater resilience to future environmental challenges, including adaptation to climate change, material shortage and emergencies (securing energy supplies and food).

It is therefore essential that natural assets should be well managed and used efficiently across all sectors of the economy and that their value reflected in all production and consumption decisions. This includes the need to take action on developing strong economy nationally, but also working internationally to tackle long-term challenges. It forms a major part of manufacturing production, employment and trade in many developing countries.

The textile and clothing industry is one of the oldest, largest and most global industries in the world. It is the typical ‘starter’ industry for countries engaged in export-orientated industrialization and is labour-intensive. It offers a range of opportunities including entry-level jobs for unskilled labour in developing countries. The technological features of the this industry have made it suitable as the first step

on the 'industrialization ladder' in poor countries some of which have experienced a very high output growth rate in the sector, such as Bangladesh, Sri Lanka, Vietnam and Mauritius, and have since become middle income countries such as (Vietnam, Mauritius) (Engelhard, 2005).

The sector absorbs large numbers of unskilled labour, typically drawing them from rural agricultural households to rural locations. Despite relatively low start-up investment costs, expansion of the sector provides a base upon which to build capital for a more technologically demanding activities in other sectors. Growth of the sector allows imports of more advanced technologies to be financed through revenues gained from garment exports.

However the characteristics of the industry (relatively low capital intensity; low investment costs; and use of low skilled labour), also mean that the industry is relatively unrestricted and able to adjust to changing market conditions quickly. Trade policy regulations has had a major impact on the pattern of textile and clothing production and are likely to do so in the near future. China has become a very important player now that restrictions on its trade are progressively being lifted. This has intensified competition for traditional textile and clothing producer's especially small and remote countries (TI, 2005).

Textile products having similar properties and functions could be produced from different fibres. In this regard, cotton is the most common natural fibre used for clothing, but natural fibres such as wool, linen and silk are also common and other possibilities include hemp, ramie, flax, jute, sisal and coir. At present, production of these fibres is falling while demand for cotton is steadily increasing, but cotton agriculture is chemically intensive and it would be expected that in the future less demanding textile fibres at present may become more common.

There is also growing interest in 'bio-fibres' renewable, short life cycle fibres obtained in principle by agriculture. Examples of bio-fibres include bamboo, soy, algae, maize, agricultural waste and nettle (TI, 2005).

World production of man-made fibres, like polyester, polyamide, polypropylene, polyacryl, acetate, cupro and viscose has increased in 2006. A smaller group of synthetic fibres like elastane, aramid and carbon fibres accounts for only a little more than one per cent of total man-made fibre production in 2006 (TI, 2005).

To reduce the environmental impacts of producing these materials, attempts were made to create alternative fibres from renewable materials. For example, novel man-made fibres of natural origin like Tencel® (lyocell) made from wood and Ingeo® (poly lactic acid) obtained from corn, have been developed (BWMB, 2013).

Chemicals are widely used in the clothing and textiles sector as pesticides and fertilizers in cotton farming and for dyeing yarns and fabrics. Intense use of chemicals may be harmful to the natural environment, to employees working in the industry and, in extreme cases, to babies and children wearing finished garments.

However, the demand for chemicals may be reduced by searching for a new fibres, organic farming, increasing the life cycle of the product and decrease the number of times that the product should be washed during usage.

According to the Organic Trade Association, "organic agriculture is an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity. It is based on minimal use of synthetic pesticides and management practices that restore, maintain and enhance ecological harmony" (OTA, 2012). Organic cotton is defined as cotton that has been grown without any use of synthetic fertilizers, synthetic pesticides and defoliated by natural means (Myers & Solton, 2002; Ferrigno, 2002). Interest in organic cotton is growing with

increasing awareness of problems with higher soil toxicity and the harmful effects on workers and consumers from conventional pesticides and fertilizers (Ferrigno, 2002). However, the production of organic cotton is still less than one per cent of the total cotton production.

In the conventional cotton industry, pesticides are sprayed over the cotton crops, causing serious health problems to cotton workers and soil degradation (Ferrigno, 2005). Synthetic insecticides for cotton are associated with large-scale poisoning and deaths in producing countries. Organic cotton production abolishes synthetic pesticides, but makes use of natural pest killers like beneficial insects and 'trap crops', to keep away harmful insects (Laursen *et al*., 1997).

Water consumption can also be a major environmental issue in connection with cotton production. The actual water consumption is in the range of 7,000 to 29,000 litres per kg of cotton fibres. This is at least 20 times higher than the amount of water used in the subsequent production of textile products (e.g. dyeing and finishing) (Myers, & Solton, 2002).

At present, organic cotton is more expensive than conventional cotton; however, over time this difference may reduce. The Research Institute of Organic Agriculture claims to have found significant advantages of organic over conventional cotton in cotton farming in central India (Eyhorn et al., 2005). The number of pest management days needed per year was reduced by around 40%. The costs of fertilizers and pest management were significantly reduced (Eyhorn et al., 2005). A study of African cotton farming claims that organic cotton crop growing improves yields per acre, enhances soil fertility and enhances food security (Ton, 2002). In 2004, a report from Greenpeace raised awareness of the presence of hazardous toxic chemicals in clothes (Pedersen & Hartmann, 2004). Many of the manufacturing processes used for fibres and yarn, for instance in pre-treatment, dyeing and printing, are chemically intensive. However, these substances can be avoided. According to the Danish Environmental Protection Agency (DEPA), for all uses and in all circumstances, a suitable less toxic alternative could be found.

Research in novel nanotechnologies and in biosciences results in what known as 'smart functions' for clothing and textiles. These technologies are still at the development stage, but promise a range of methods that can be used to change the behaviour of clothing and textiles in use. It is obtained through application of a coating to existing fibres, yarns or products. Possible functions include variable insulation, improved resistance to water, or sensitivity to sunlight.

Switch to organic cotton with less toxic dyes causes a dramatic fall in the toxic impact of the product but increase its price.

The toxicity of clothes washing is not because the washing powder is particularly toxic nor has low biodegradability but mainly because a relatively large amount of detergent is discharged to biological wastewater treatment. Approximately 125 gram in the life cycle of the cotton product compared to only one gram of the finishing chemical (DHI Water & Environment, 2003).

However, all other economic measures in the world will improve assuming that consumers are willing to pay a higher price for organic cotton products.

It is well known that, the production stage of the life cycle of the product controls the use stage. Thus as the production rate of new product is halved, the impacts are nearly halved even though the introduction of nanotechnology in the production of polyamide fibre may increase consumption and emissions.

Reducing the rate at which we wash our clothes is beneficial. The application of 'smart technology' that halves the number of washes in the life cycle of the product is

also beneficial. However, the introduction of an 'easy care' process during the finishing stage of production will increase the energy consumption for this process.

The benefits obtained from the reduction in washing will reduce the overall environmental impact depending on the category. However, there is very little evidence available about the environmental and health impact of nanotechnology, so the toxicity impact of the 'easy-care' process is not yet clear. However, it is likely that the toxicity impact of conventional cotton growing and harvesting would still dominate.

For the end-consumer, the effect of reducing the number of washes will be to reduce the need for electricity, water and detergent. It has been reported that (EW, 2003), the market for laundry detergents in the world has been over supplied for the past 10 to 15 years, so laundry liquids are sold at similar prices to 20 years ago and about 80% of all laundry liquids are sold at a discount. The consumer will therefore see little benefit from washing less, despite the increase in energy prices (Walley et al., 2008). Therefore, it would be expected that, significant changes could be made in the sustainability of the clothing and textiles sector through changing the material sourcing and technology developments.

In recent years, consumers are well aware of the environmental impacts of the textiles and clothing sectors and more people are looking for green alternatives (OJEC, 2002). However, just by looking at the product, it is difficult to see whether it has been made from conventional or organic cotton, dyed with non-toxic or harmful dyestuffs. Therefore, classes of labels were introduced showing the requirements that manufacturers must meet before they can call their products 'green'. For example, organic certifications from the Soil Association and regional and global eco-labels may be shown on products that meet these requirements (OJEC, 2002). Widely recognized eco-labels are helpful guidelines for consumers who want to buy eco-friendly products.

There is increasing discomfort among consumers about 'scientifically proven' innovations. In addition, smart clothing and textiles have intelligent properties, but are more expensive than traditional and conventional clothing. A trade-off exists between paying a bit more for a product that claims to last longer, and paying the same price for a product of familiar quality. However, during the last ten years, the smart clothing market has grown significantly. In order to provide confidence in the claims made for new technologies, some manufacturers, for instance, offer ten-year wear warranties (OTIS, 2012).

In depth researching and better understanding of the impacts of new products and materials, it is possible to note that:

Substituting natural fibres for synthetic fibres may be a useful move and of a significant benefit in the general environmental indicator, but it would slight worsening the climate change indicator.

Adoption of organic cotton in clothing, and increased use of wool (as opposed to polyamide) depends on whether the consumers agree to pay more for a more 'ethical' product or not. The toxicity impact of other chemicals used in the production of conventional cotton is not significant compared to those used in agriculture.

Eco-labels, which aim to set environmental standards for products assessed by governmental bodies, may in fact become the new trade barriers whereby retailers and consumers in developed countries can enforce standards on their suppliers. However, the problem is that, eco-labels could be used as unfair trade barriers, since the standards often favour the current standards of the imposing territory (for example the

European Union) and therefore give an advantage to internal producers (GEN, 2004; OTIS, 2012).
The main factor to look at in order to reduce the environmental impact of the sector is the consumer behaviour. The consumers should reduce the amount of clothing and textiles they purchase each year.
However, this behaviour is applicable to only a small minority of consumers and would have economic and social disadvantages elsewhere.

CONCLUSIONS

The largest part of the work in this paper was a wide-ranging analysis of various possible futures reported in the literature.
Rapid growth and creativity without undermining the capacity of the environment to support our quality of life in the long term can be achieved by using new technologies, accepting different ways of living and working, and investing in infrastructure. While these changes may involve some short-term costs and difficult choices, they also create new business opportunities and new jobs, as well as increasing the flexibility of our economy. They will help us to avoid much larger costs in the long term and allow better economic growth.
Consumers, government, business (mainly retailers) and "information providers" (educators, campaigners, journalists and academics) can play a major role in this sector.
Consumer education is vital to ensure that fact based information on the individual impacts of a product are made clearly available and then to support consumer understanding of the consequences of this information. Eco-labels are a step towards this goal and development of well-grounded information through eco-labels is important.
Reducing the purchased rate of clothes in the country would directly reduce the employment and income generated by the sector. Therefore, if half the material mass was used to create half the current number of products, with higher quality material inputs and double the labour input for each item, the sector could halve its material flow without economic loss provided that consumers are prepared to pay a higher price for a product that lasts twice as long.
Adoption of new technologies such as; new means to freshen clothes without washing, fibre-recycling technology, reducing the washing temperatures through the development of new detergents, increased product life and reduced need for care in use through novel coatings and smart functions, new longer lasting fibres that support durability will reduce the impact.
Legislation could be used to band specific undesirable components such as particular toxic chemicals, but this would be difficult to impose on imports due to the complex range of chemicals involved.
However, the key to change remains the behaviour of the consumers so the role of educators and campaigners in raising awareness of the consequences of consumer choices is the main gear for driving change in the sector to reduce environmental impact and promote social equity.

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