



CAN 'UPCYCLING' GIVE ROMANIAN'S FASHION INDUSTRY AN IMPULSE?

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Abstract: Fashion's impact on the environment includes the entire lifecycle of a garment. There are many environmental issues associated with the textile sector on the entire life cycle of production and consumption. The clothing industry needs to find imaginative solutions to produce environmental improvements. The aim of this paper is to review concepts regarding textile waste that reach the end of their first life cycle and to evaluate the potential for recyclability of those materials. Intent of this paper also tries to reduce the amount of textile waste in the landfill by exploring different methods. This was done by first assessing and analyzing the waste followed by characterizing the waste for different properties. If the properties of textile waste are not suitable enough to be manufactured in new fabrics, other alternatives could be explored. One of our proposals is to use creativity of designer in order to create new products through upcycling. Redesigning through a creative modification of a product out of used or upcycling in an attempt to generate a product of higher quality or value than the compositional elements can be a solution to reduce waste yet is still marginal. Starting or shifting to a business involving textile waste can offer an economic benefit of upcycling. However, upcycling explore to provide an interim solution to the textile waste problem, by optimising the lifetimes of discarded clothes from an inefficient system, while recycling technologies moves to develop more sustainable approaches.

Key words: Recycling, textile waste, fast fashion, waste management, life-cycle of clothes

1. INTRODUCTION

In an era of fast fashion, or mass-produced, budget-priced, disposable clothing, textile waste has continued to grow. Moreover fast fashion leaves a pollution footprint, with each step of the clothing life cycle generating potential environmental hazards. Since we have enormous amounts of textile and clothing waste, redesign or upcycling has begun to be a popular fashion approach. Recycling means that the product is transformed into new material or fibres. The recycling approach needs mono materials, which means that the whole garment who is made from more materials (threads, buttons, zipper etc.) must be dismantled beforehand.

2. THE FASHION INDUSTRY AND CLOTHING CONSUMPTION

The textile and fashion industry is one of the biggest and oldest industrial sectors in the world. Over the past decade, the fashion industry has grown at 5.5% annually[1], to now be worth

an estimated \$2.4 trillion. In fact, not only does it touch everyone, but it would be the world's seventh-largest economy if ranked alongside individual countries' GDP.

The overconsumption of fashion is stimulated by fast fashion and its cheap, constant flow of new designs and limited runs. Clothing prices fell drastic during the last 30 years; by 26.2 % in Europe and 17.1% in the US. At the same time consumption flourished with the number of pieces sold in the UK increasing by a third, leading to over 2 million tonnes of clothing being consumed every year.[2] The Environmental Protection Agency estimates that, Americans are throwing away more than 15 million tons of textiles — about 85% of their clothes — each year, accounting for 9% of total non-recycled waste. The textile waste increased from 14.33 million tons in 2012 to 15.13 million tons in 2013. In the same time, unfortunately, the percentage being recovered and recycled dropped from 15.7% to 15.2%. In terms of carbon emissions, the recycling of 2.3 million tons of clothing each year is equivalent to taking 1.3 million cars annually off the road.[3]

According to the European Commission, Europeans discard 5.8 million tonnes every year, with 75% going to landfill or incineration and only 25% being recycled [4] with the UK alone responsible for 350,000 tonnes of that [5]. That's problematic not least because nylon fabrics take around 30-40 years to decompose, rope 3-14 months, while wool emits methane as it decomposes, a key contributor to greenhouse gases [6].

Of all the old clothing, 70 % is used as second hand clothing, 6 % is waste bags and zips, 8% is used for reclaiming fibres and making recycled products, 7 % is used as wiping material and the remaining 9 % is shredded and used as stuffing. It is a surprising fact that over 70 percent of the world's population uses second hand clothing [7].

3. ENVIRONMENTAL ISSUES ON THE LIFE CYCLE OF THE CLOTHING SECTOR

There are many environmental issues associated with the clothing sector on the entire life cycle of production. In figure 1 we mention only the solid waste arising from yarn manufacturing of natural or artificial fibres, fabric and garment production, in use and disposal of products at the end of their life. Over their life-time, products can contribute to various environmental impacts. Life cycle thinking considers the range of impacts through the entire life of a product. Life cycle thinking can be used to help decision-making in the field of waste management and to identify the best environmental options. It can help policy makers understand the benefits and compromise they have to confront when making decisions on waste management strategies [8]

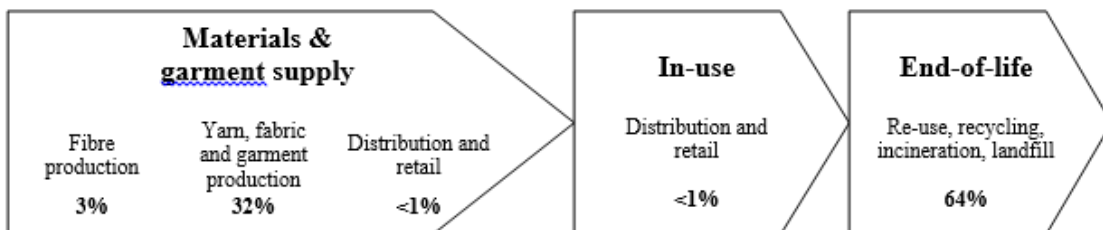


Fig. 1. Estimated contribution (%) of each stage of the garment life-cycle to the waste footprint (Source: adapted from WRAP,2011)

4. RECYCLING AND UPCYCLING OF GARMETS

There are multiple environmental benefits associated with recycling clothing. It reduces the amount of pesticides used in growing cotton or to make fabrics from petroleum sources and the water needed to dye fabrics, and cuts down on the pollutants, greenhouse gases and volatile organic compounds released into the water and air from manufacturing processes.

During the last 30 years industrial development has achieved environmental improvements and has moved towards a smaller environmental impact. However, at the same time production as well as consumption has increased by the same levels, which erodes the environmental benefits of the technological advances: i.e. the rebound effect [9, 10]. The increasing amount of textile and clothing waste has led to the necessity of development of methods using the textile waste, i.e. reuse, recycling or redesign.

The waste management hierarchy, presented graphical in the form of a pyramid, indicates an order of preference for action to reduce and manage waste. The strategy to waste management must give priority in the first place the prevention, in the second place recycling, reusing and revalorization and finally dispose waste [11, 12].

The fashion industry can become environmentally active and contribute to our society more than just economically. McDonough and Braungart, creators of the cradle to cradle concept [13], have advocated radical design innovations for perpetually circular material reuse [14]. They offers a broad definition claiming that upcycling is “*optimizing the materials, ingredients, and process pathways in such a way that waste is converted to raw materials for nature or some other industry*”[15]. Many leading apparel retailers like H & M, Inditex or sportswear retailers like Adidas and Nike presents and market their products with the percentage of recycled material in the product profile. On their Annual Reports an important place is taken from their statistical data that disclose the quantity of clothes they have collected from their shoppers and the amount they contribute to international charity from their revenue.

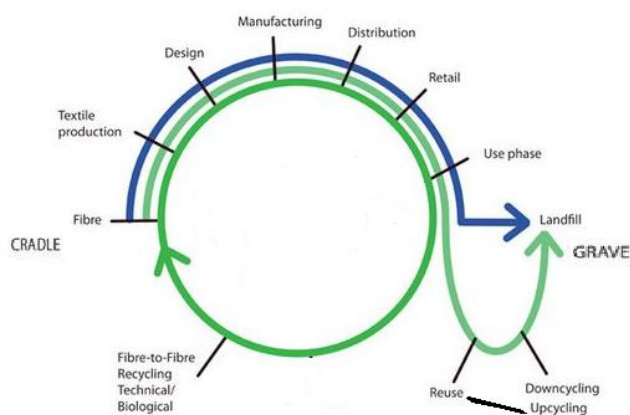


Fig. 2. Schematic life-cycle for clothes

4.1. Recycling of textile waste

There are in essence two types of textile recycling: fiber recycling and polymer recycling. Fiber recycling means the garment is shredded back into fibers that are typically blended with new fibers to make a new yarn for new products. Polymer recycling is typically used with polyesters that are shredded and ultimately melted down and turned into plastic pellets that are then respun into fibers for new polyester applications[16].



The recycling of clothing process includes more steps. Clothing consisting of fabrics such as cotton, polyester, nylon and rayon. First, the unwearable garments are sorted and graded as natural, synthetic and blended fabrics. There are fundamental differences between natural and synthetic fibers but the sorting plants that recycle textiles are able to determine the future of the unwanted clothes.

In the recycling process for natural fibre (cotton, wool, silk etc) clothes, first of all, the unusable natural textiles are sorted into colours. Color sorting results in fabric that does not need to be re-dyed. The color sorting means no re-dyeing is required, saving energy and avoiding pollutants. The textiles are then pulled or shredded so that what is left is an amalgamation of different fibres. Depending on the end use of the yarn, other fibers may be incorporated. The yarn is then cleaned and mixed through a carding process. After that, the yarn is re-spun and ready for subsequent use in weaving or knitting. These newly produced recycled textiles are then picked up by sustainable designers and manufacturers. Woolen garments are sent to other firms that make fibre renewal to make yarn and fabric. Not all fibers are spun into yards; some of them are compressed for textile filling such as in mattresses, for fillers in car insulation, roofing felts, loudspeaker cones, furniture padding, panel linings and many other uses. Cotton clothes are recycled and used for paper manufacture, automotive, and mining industries and different other uses.

In the case of polyester-based textiles, garments are shredded and then granulated, and processed into polyester chips. Polyester is a relatively easy material to recycle. Because its oil based, it can be melted down and reformed into new fibers. The polyester chips are subsequently melted and used to create new fibers for use in new polyester fabrics.[16]

4.2. Upcycling of textile waste

Upcycling can be seen as a new environmentally conscious view in fashion design that repurposes discarded garments and textile waste and reintroduces it back into the fashion market. It's an improved form of recycling that, instead of transforming down the clothings or fabrics, uses them in their original form, giving them a new purpose and a much better quality.

Murray (2002) describes it as *“not merely conserving the resources that went into the production of particular materials, but adding to the value embodied in them by the application of knowledge in the course of their recirculation. So, if one can add value – economic, intellectual, emotional, material – to a product through the process of reuse, it can be called ‘upcycled’”*[17]

The process involves a substantial amount of creativity and vision, based on a fundamental environmental consciousness. The end result is typically a product or item that is unique and sustainable. It takes courageous imagination to propose systemic solutions that bypass the mainstream of what we regard as philosophy about fashion and clothing business. The world of upcycling has exploded in the past few years, and there are a large number of inspirational designs in this facet of sustainable green fashion. At the beginning of the 21st century several designers have made use of the concept of upcycling in designing trendy products. Producing eco-friendly fashion is becoming more of a priority for brands across the board from luxury (ex. Reformation, Charlotte Bias, Viktor & Rolf), to high street. Mega brands now recognise how important sustainable fashion is to their consumers. Even large companies have begun to be involved, such as the British fashion brand Marks & Spencer who launched a special suit line, which is made of recycled materials [18]. Upcycled fashion offers creativity and individuality because consumers won't see someone else wearing the same outfit. This is an ideal way for those who want to be self-expressive to find fashion that fits their style.



4.3. Textile waste and upcycling in ROMANIA

Although the amount of waste pre-consumption has steadily decreased [19], textile waste in Romania has seen a tremendous growth lately, both due to rising imports of clothing and especially due to large imports of used clothing. Because such large volumes of second hand clothing are constantly being imported and consumed, large volumes of worn clothing held by the user are discarded. It creates a large waste stream at the end of the functional life of clothes, which are finally disposed of in landfills but Romania has no large scale recycling [20]. From a total of 4379 companies in the garment sector, approximately 57.8% (2530 companies) have fewer than 9 employees, 26,1% (1144 companies) have between 9-49 employees, and only 0,28% from the Romanian have more than 250 employees. The sharp competition in the sector and continued decline in competitiveness of Romanian garment industry [21] may challenge some companies to migrate to upcycling of textile. Integrating redesigned clothing into the fashion system could be one of many alternatives to environmentally harmful consumer behavior, such as disposing of unwanted clothes into landfills. Redesigning through a creative modification of a product out of used or upcycling in an attempt to generate a product of higher quality or value than the compositional elements can be a solution to reduce waste yet is still marginal. Starting or shifting to a business involving textile waste can offer an economic benefit of upcycling.

5. CONCLUSIONS

The clothing industry needs to find imaginative solutions to produce environmental improvements. Upcycling has become lately a very popular subject in the fashion industry. It is one of the most sustainable circular solutions in the waste hierarchy, positioned between reuse and recycling, since upcycling typically requires little energy input and can eliminate the need for a new product [22]. However, upcycling explores to provide an interim solution to the textile waste problem, by optimising the lifetimes of discarded clothes from an inefficient system, while recycling technologies move to develop more sustainable approaches.

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