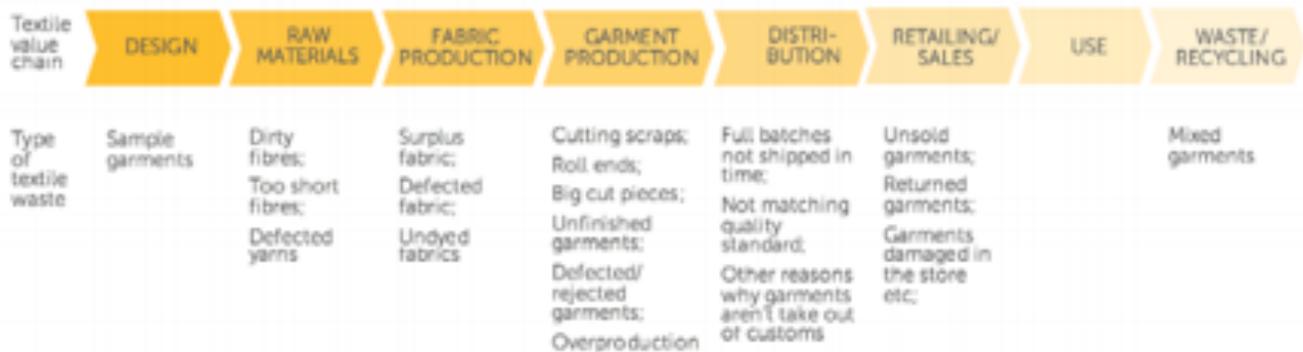


Fashion supply chains are on the verge of a major transformation which will have dramatic effects on the associated logistics industry. These changes are being thrust upon manufacturers and retailers in the sector due to the growing unease about the environmental impact which the trend towards fast fashion, in particular, is having. In a world in which sustainability is becoming engrained in many companies' business models, the 'buy, wear once and then throw away' model which has become the norm for the industry is becoming regarded by many as increasingly inappropriate. Of course, waste does not just occur at the finished product/post-consumer stage. It is also endemic in upstream supply chains with many by-products from the manufacturing process being incinerated or dumped.



Source: Reverse Logistics

Instead, some brands are turning towards 'considered design'. According to one consultancy this term applies when, 'the designer considers the materials and their impact, the production, and the consumer use stage, to minimise the negative effects on the world around them.' This involves 'cradle to cradle' design where there is either a:

- Biological cycle, with products being returned harmlessly to nature or,
- Industrial cycle, with non-degradable material being recycled.

Closing the loop in fashion supply chains would have significant impact on the amount of clothing being sent to landfill. In the UK alone £12.5 billion worth of clothes - 300,000 tonnes - were disposed of in landfill in 2017 according to waste charity, WRAP². On a European-wide basis, another report states, 'In 2015, between a quarter and a half of the clothing bought in Europe is likely to end up in residual waste. This represents a huge quantity of clothing; given the total consumption of clothing is over six million tonnes.'³

Digital technologies can be employed to reduce these levels of waste and, as this paper will go on to reveal, are being rolled out in downstream supply chains. However, they also have a role to play upstream to mitigate waste in the production phase.

This paper looks at some of the innovations which are part of a growing trend towards 'circular fashion' at all stages of the supply chain. It also looks at the implications, not necessarily positive, for the logistics industry.

UPSTREAM SUPPLY CHAINS

According to a whitepaper published by consultancy Reverse Resources, manufacturing by-products, also termed 'pre-consumer leftovers', represent 25% of total consumption in the fashion industry. In some cases, it amounts to as much as 47% of the fibres and fabrics bought by a factory⁴.

1 <https://goodonyou.eco/what-is-a-clothing-supply-chain/>

2 <https://www.thetimes.co.uk/article/clothes-worth-12-5bn-are-thrown-in-bin-b8rqfrcg2>

3 <http://www.ecap.eu.com/wp-content/uploads/2018/07/Mapping-clothing-impacts-in-Europe.pdf>

4 <https://reverseresources.net/about/white-paper>

Types of waste can include:

- Sample garments
- Defective yarns
- Surplus fabric
- Cutting scraps
- Roll ends
- Defective garments
- Overproduction

The consultancy believes that the level of waste has been systemically underestimated by manufacturers which has meant that the issue has not been given the level of importance which it deserves.

The authors of the report assert, 'It will soon be technically possible to recycle at least 80% of all textile leftovers of any solid or mixed fiber compositions commonly used in fashion industry.'

Tracking of by-products would help the global brands understand what proportion of scraps were being downcycled or dumped, and the proportion which was being fed into the proportion of new yarns. In fact, many large offcuts could be used in the production process without recycling i.e. in sections of a garment which are unseen.

The Blockchain is one way in which to create visibility, ensure supply chain integrity and track materials. Start up company, Bext360, has partnered with the Organic Cotton Accelerator and other not-for-profit organizations as well as tech companies and retailers such as C&A, Zalando and PVH Corp to trace bags of cotton from the farms where they were produced to the processing plants. A next stage will involve providing visibility from processor to consumer, generating 'tokens' which will provide digital 'fingerprints' to prove origin and authenticity. This will eventually play an important role in identifying the materials present within a clothing item, creating the potential for higher levels of recycling at all levels of the supply chain (see next section).

Other upstream sustainability initiatives include, the **Open Apparel Registry (OAR)** (supported by C&A Foundation), a database of all garment production facilities in the world open to all organizations in the fashion industry. It assigns each facility a unique identifier number, allowing companies greater visibility of supply chains including who else their suppliers may work for. By sharing information, this database, in theory, should allow organisations to use the most ethical suppliers and standardise processes.

As will be discussed later in this paper, recycling a larger proportion of waste in the upstream supply chain will have a significant impact on the amount of raw materials required. This will have important implications for the logistics industry.

DOWNSTREAM SUPPLY CHAINS

'Circular Fashion'

One of the major problems involved in recycling second hand clothing is identifying the materials used in its production. A barcode may describe certain product attributes, such as size, style and colour but as they were never meant for use post-sale they contain little specific information about materials. The result of this is that recycling becomes very difficult and a large proportion of goods are sent to landfill.

One solution to this is to tag products with identifiers which do contain this information. This may involve an RFID tag or QR code, for instance. The tag would link this to the product's digital identity on the internet.

According to one global initiative, Connect Fashion, the digital identity makes it possible to connect a product to the Internet of Things (IoT), and exchange information about the product via the internet.

The Initiative 'CircularID' has three components⁵:

1. A digital 'birth certificate' consisting of core data on the permanent attributes of a product and information necessary for the regenerative processing at end of life. This includes: name, brand, SKU, colour, description, manufacturing location, and material content.
2. A 'digital passport' showing when a physical identifier (tag) has been used to access the data held on the product. This builds up a record of product usage and durability although security is required to ensure privacy of the wearer.
3. Physical Identifier. This could be a RFID tag, NFC, QR Code, UPC barcode. The main issue is making sure that the identifier remains on the clothing product for its entire life cycle.

CircularID is a global standard which in theory will enable any company anywhere to access the data stored on a tag. Presently such information, where it exists, may be held in multiple databases even within a single company. In contrast the initiative is an Open System with a shared protocol which will allow any number of stakeholders to access the data, whether retailers, brands or companies active in resale, rental, recycling, reusing or disassembly processes.

Retail partners include H&M, Target and PVH as well as Microsoft and it is chaired by EON and Closed Loop Partners.

Online Clothing Rental Market

A fast growing segment of the market is that of Clothing Rental. One estimate puts the global market size at over a billion dollars in 2017 and set to grow to almost double that by 2023⁶. Services are aimed at consumers who cannot afford to buy a new outfit on a regular basis or, crucially, choose not to on the basis of thrift or sustainability. As with car sharing, this trend relies on asset ownership no longer being as important to a new generation of consumers – the so-called 'millennials'. Although rental of expensive, special occasion outfits (such as formal wear for weddings) has always been popular due to the infrequent nature of their use and the relative cost, the online clothing rental market is aimed at a much broader audience. In the UK a survey by shopping mall owner Westfield in 2017 suggested that 50% of 25-34 year olds would be willing to pay £200 and over a month on clothing rental.

As well as supporting many retailers' sustainability credentials and providing shoppers with an ever-changing wardrobe at a lower price point, online clothing rental reduces wardrobe space required (especially important as space is more of a premium in urban areas) and provides consumers with the opportunity to try new brands.

Mobile commerce has also been a driver of demand making the rental much more convenient and not just in Europe and North America. Consumers in Asia Pacific are adopting the model, especially as levels of disposable income increase.

Examples of retailers who are entering the market include Urban Outfitters. Their service, called Nuuly, provides subscribers with a six item box selection of clothes to rent for \$88 per month. Selection can be made from the range of clothes provided by the retailer and its brand partners Reebok and Levi's. Its management believes that the opportunity could be worth \$50 million a year to the company, attracting a target of 50,000 subscribers within its first year.

⁵ <https://www.connect-fashion.com/how-it-works>

⁶ <https://www.prnewswire.com/news-releases/online-clothing-rental-market-is-expected-to-reach--1856-million-globally-by-2023---allied-market-research-618522543.html>



Another rental start up, Haverdash, is more aggressive on price allowing subscribers to swap three rented items as often as they like for \$59 per month, providing clothes from retailers such as French Connection and Cupcakes and Cashmere. Shipping, returns and dry cleaning is free of charge. American Eagle's offering 'Style Drop' comes in at \$50 a month.

Perhaps the best known in the market, Rent the Runway, has been around for a decade and has recently been named as the ninth most disruptive company in the world with a turnover of \$100m. It allows subscribers to rent 4 items a month for \$89 and an unlimited selection for \$159 from over 550 designer partners. It has recently received a \$200 million investment by Temasek on a valuation of \$800 million.

Other smaller retailers can use specialist 'white label' clothing rental fulfilment providers, such as Caastle ('Clothing as a Service'). They can develop websites and also provide the logistics infrastructure required. Most retailers in the market have developed the business as separate to their mainstream operations and have different brands, distribution channels and of course returns systems.

This is not just a US trend, as already mentioned. In Europe a number of start ups are trying to attain first mover status, such as Front Row, renting clothes from Dolce & Gabbana, Chanel, Fendi and Stella McCartney, and Girl Meets Dress or Hire Street, the latter focusing on high street brands. In Germany, retailer Tchibo has launched Tchibo Share for children's clothes.

In Asia Yeechoo has been active in Hong Kong since 2014, aimed at the designer segment of the market, and it now has 30,000 users. Pret-a-Dress is a more recent start up as is Wardrobista, although the latter adopts a different business model, creating a C2C market for the rental of used dresses under a 'share your dress' initiative.

As with many e-retailers, there is no single model for logistics operations although in-house arrangements are popular such as that operated by Nuuly which handles its own fulfilment, logistics and laundry. To cope with demand it has built a dedicated warehouse, fulfilment and laundry/dry cleaning centre in Philadelphia.

Rent the Runway has also decided on an in-house fulfilment and logistics process to enhance its customers' experience and whilst doing so it has built the largest dry-cleaning facility in the US. Its processes are slick to enable high inventory velocity, with returned items, received, cleaned and made available within a day at its 150,000 sq ft fulfilment centre.

The following system allows the high levels of efficiency:

1. Returned items are received (via UPS) and, after scanning, the system decides which need to be processed fastest based on levels of demand
2. Items are inspected and allocated for regular cleaning, stain removal or mending
3. Dry cleaning machines can sterilize and clean in under a minute
4. If stain removal is required, the item is sent to a specialist team to use the appropriate cleaning materials
5. Seamstresses are employed to mend items or re-fix sequins
6. Items are made available for dispatch and if necessary picked, packed and dispatched.

The scale of the operation is critical to the success of the company. Logistics inefficiency would kill the business model not only by increasing the level of inventory required to fulfil customer needs to unsustainable levels, but by compromising customer service. The company says that by owning the logistics infrastructure it provides critical insight into customer behaviour which allows it to remain flexible and meet the needs of the fast growing market.

7 <https://www.drapersonline.com/business-operations/a-hire-purpose-the-opportunities-in-rental-fashion/7033812.article>

8 <https://digital.hbs.edu/platform-rctom/submission/rent-the-runway-a-trendsetter-behind-the-scenes-too/>

WHAT ARE THE IMPLICATIONS FOR THE GLOBAL LOGISTICS INDUSTRY?

The initiatives which are being proposed and which, in some cases, have already gained traction are set to have a range of impacts on the logistics industry; some negative, some positive. On the positive side, clothing rental could provide a huge opportunity for companies involved in the last mile and returns sector. Whereas in the traditional fashion supply chain multiple items are delivered to a single store in a single consignment, online rental requires an item to be delivered, most probably to a home address. When the item of clothing has been worn, it then requires a return to a processing centre where it will be assessed for damage, wear and cleaning. Once the cleaning is complete, it can then be returned to the warehouse and listed on the WMS as available to rent. So, not only is there an additional transport element but there are several steps and value adding processes within the returns warehouse.

Upstream, however, the trend to more recycling has negative implications for the industry. Vast amounts of textile raw materials are produced and transported each year – 72.5 million tons of cotton alone without taking into account synthetics⁹. China, India and the USA are the top three producing countries and others in the top ten are similarly geographically diverse – from Pakistan to Brazil, Indonesia to Turkey. By cutting down on the waste of by-products, as highlighted earlier in the paper, less cotton will be required to be moved from places of origin to processing hubs and garment manufacturing facilities. Whilst a considerable volume of this traffic is domestic (intra-China and intra-India), much involves the international movement of cotton to markets such as Bangladesh, Italy, Turkey and Vietnam.

There are also implications downstream. More recycling could mean that fibres which were designed to be renewable and sustainable could be re-used in the production of new garments. The business case for recycling would be improved if the manufacturing process was re-shored and international shipping costs were eliminated. This would mean that the collection and re-cycling of materials would occur close to, or in, the markets of final consumption in the West i.e. Europe and North America. Asian and in particular Chinese manufacturers would turn their focus to local consumers in the Asian region where demand for fashion items is already strong and growing. Hence, there would be a transformation of supply chains from global to regional, some based on recycled materials and some still based on the use of virgin materials.

If this indeed occurs, intercontinental freight forwarders, shipping lines and air freight carriers would lose out. In contrast domestic or regional carriers (particularly trucking companies) would benefit both from the movement and storage of recycled materials to locally based garment manufacturers as well as from the storage and distribution of finished products.

⁹ <https://businessfinancearticles.org/cotton-producing-countries>