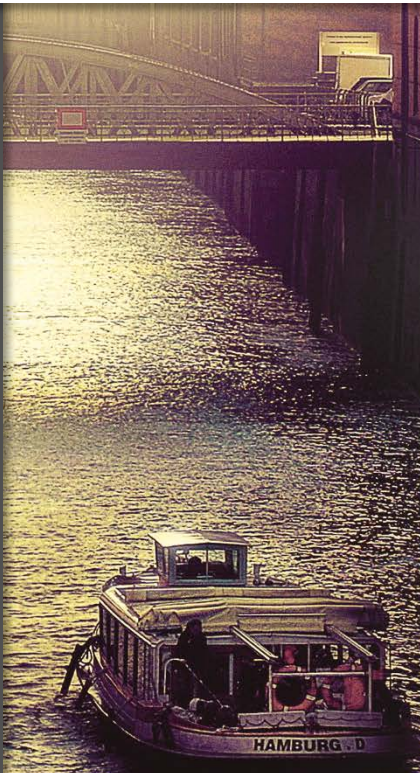Sharon Cullinane, Michael Browne,
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Improving Sustainability through Digitalisation in Reverse Logistics

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Improving Sustainability through Digitalisation in Reverse Logistics

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Online purchases of clothes are increasing rapidly and with it, the number of returns. Return rates of clothing bought online can be up to 70%, involving high reverse logistics costs to retailers as well as sustainability costs to society. This paper seeks to illustrate how digitalisation can potentially decrease both such costs.

The paper is based on a literature review and subsequent empirical research. Qualitative information was obtained through detailed interviews with key personnel and observations of the reverse logistics operations of five major clothing retailers and two major logistics companies in Sweden, carried out in Spring 2017.

The research confirmed the importance to the retailers of reverse logistics and highlighted some of the environmental consequences of the reverse logistics operations. It also unveiled several areas where digitalisation could both reduce the number of returns made in the first place and improve the efficiency of the reverse logistics processes involved in dealing with returns.

There is very little research on reverse logistics in the online clothing industry despite it being the single biggest sector of online purchases in practically every country in the world. This paper brings to light some of the little-considered issues involved as well as suggesting ways in which technology can improve the sustainability of such operations. Both elements are original.

Most retailers are concerned about the costs and sustainability of their operations. By providing insights into how these can be reduced, management can make better informed decisions.

Keywords: Reverse logistics; Clothing returns; Digitalisation; Sweden

1 Introduction

E-commerce has been increasing continuously over the past decade and has now become a feature of everyday life. Clothing has become the single biggest category of goods (by number of items) bought online in most countries in Europe (Eurostat, 2016). Initially, customers bought clothing from existing retailers who opened webshops to complement their existing stores. Catalogue companies took advantage of their knowledge of the market and their existing customer-orientated logistics systems and moved swiftly into the online market. Now, however, the online clothes market has been joined by some major 'pure' e-tailers (i.e. retailers which are purely internet based), such as Zalando, Asos, Amazon, Very and Boozt as well as a huge number of smaller e-tailers.

A major unintended but nevertheless important consequence of the growth in the e-tailing of clothing is returns. On average, 22% of clothing items bought on the internet are returned. In Sweden alone, this amounts to over 3 million return packages per year. However, this average conceals major differences between clothing categories and countries (e-commerce, 2016). In the high fashion sector the return rate is around double the average and in some countries in Europe, notably Germany and Finland, the return rate is much higher still. For high fashion clothing in Germany, for instance, the return rate can be over 60%. The reasons for this anomaly include regulatory, cultural and payment differences in these two countries compared to the rest of Europe.

Returns are very much dependent on consumer behaviour. Clothing returns are made for a variety of reasons such as:

— Damaged/faulty items

— The wrong items being received

— The items not looking like they do on the website/not matching expecta-tions

— The items not fitting

— The customer just changing their mind

When customers buy clothes in a shop, they have the opportunity to try them on. They may take several items into the changing room and reject them all or buy one or two pieces. There is no charge for trying on clothes in changing rooms and rejecting those which are not wanted (for any reason). Buying online does not allow this and to deal with this issue, companies wishing to sell online have had to try to emulate the in-store shopping experience. Part of this is free, convenient returns. Many customers now routinely buy one item of clothing in several colours and/or sizes and return those they do not want.

The outward logistics operations of most companies are usually well organised and fairly efficient. There are well documented sustainability issues concerning the 'last mile' element of the delivery and considerable research is being carried out on ways to improve the environmental sustainability of online deliveries (see for instance Cullinane, 2009; Edwards et al, 2010; Carillo et al, 2014; Mangiaracina, 2015; van Loon et al, 2015). However, the returns process, involving reverse logistics, is much less well researched.

The Reverse Logistics Association defines reverse logistics as: "…the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal" (RLA, 2016). For retailers, dealing with returns has often been almost an afterthought. However, now that the scale of the issue is beginning to be appreciated by the retailers (and particularly the e-tailers), more efficient, sustainable reverse logistics solutions are being sought. From a sustainability and city logistics perspective, it is important that the reverse logistics operations are paid equal attention to the outward logistics operations as essentially it involves all of the same processes as the outward logistics, except in reverse, but is currently being carried out in a less efficient way. Given that the possibility exists of returns increasing still further in the future, particularly as online shopping continues to increase, this poses a big challenge. The case-study retailers involved in this study suggested that the proportion of clothes bought online in Europe would be likely to double over the next few years, implying a huge increase in the volume of returns if no action is taken to reduce their number.

This paper will proceed as follows. After outlining the methodology used for this study, we will briefly discuss some of the major sustainability issues involved in the reverse logistics operations. We will then go on to describe some of the applications of digitalisation that are being used, or are being considered for use to reduce the sustainability problems associated with reverse logistics in the clothing sector. We will divide the solutions into two categories; those associated

with reducing the number of returns in the first place and those associated with improving the efficiency of the reverse logistics process.

2 Methodology

Existing research on reverse logistics in the clothing retail industry is minimal and research on the sustainability of the reverse logistics in the clothing retail industry is even less. Following an extensive literature review of the general issues involved, it was decided that qualitative, case study based research was required to investigate the specific subject in some depth. Case study based research involves the investigation of a contemporary phenomenon in depth and in a real-life context using multiple sources of evidence combined with prior theoretical declarations (Yin, 2009). The emphasis is on intensive examination of a specific issue (Bryman and Bell, 2011). During the spring of 2017, in-depth semi-structured interviews took place with five major clothing retailers and two major distribution companies (including the Swedish national carrier) in Sweden. Interview schedules were written in advance to guide the interviews. However, interviewees were given a great deal of flexibility within the interviews to develop their arguments and discussions. Observations of the reverse logistics operations in these companies also took place. Within each company, interviews involved between 1-6 key people at their head offices. Interviews lasted approximately 3 hours at each company. Clothing retailers included mixed clothing retailers (traditional bricks and mortar companies with an online platform) and pure e-tailers (companies with no bricks and mortar stores) and included some of the largest retailers in Sweden. All companies traded internationally. As we are only discussing general principles in this paper rather than trying to pinpoint specific issues, the details of the companies are unimportant and will not be described. In this text, (r)e-tailers denotes both companies which are bricks and mortar retailers with an online platform and pure-etailers

3 Findings in relation to sustainability

The findings are confined to general issues as they are not the main focus of the paper. They are presented in order to highlight some of the areas where digitalisation can help provide solutions. In order to give some context to the work, table

Table 1: Returns, by country and brand, 2016

Country	Brand A (low fashion)		Brand B (high fashion)	
	% returns (on an item basis)	Items returned	% returns (on an item basis)	Items returned
Finland	24.5	126,000	45	51,700
Sweden	15.6	248,000	31.6	176,000
Denmark	13.9	44,000	25.7	10,000
Norway	14.2	74,000	25.3	7,500

Source: Case-study company

1 shows the returns from one of the (smaller) case study companies which sells mostly (but not exclusively) to the Nordic countries. It is an online (ex-catalogue) company with 2 major clothing brands. Brand A is more traditional, aimed at slightly older people, whereas brand B is more high fashion, aimed more at young people. All the returns are made to a warehouse located in southern Sweden before being transported to Estonia for sorting, processing and re-packaging and then being transported back to the same warehouse in Sweden and being re-sold.

The reverse logistics operations associated with online clothing returns are complex, time consuming and expensive. The first crucial element in the returns process is what may be termed 'the first mile' (in contrast to the 'last-mile' in the outward delivery operation), where the package leaves the customer's home. It may involve an element of passenger transport as customers may take the return parcel to a pick-up or collection point. Alternatively, a parcel carrier may pick the parcel up from the customer's home. Generally, the process involves the transportation of packages from individual dispersed customers to an initial hub where the parcels will be consolidated and subsequently often line-hauled to a retail company's warehouse (i.e. from the many to the few). The sustainability of this element of the process is affected by the mode of transport used by the individual in the process of taking the parcel to the distribution point; the journey type (whether or not it is part of a trip chain); the parcel pick-up density (i.e. the number of parcels collected by the parcel company per pick up) and the sustainability of the transport mode used by the parcel carrier.

Once the return parcel has been received by the retailer, the reverse logistics operation involves a time-consuming process of opening, sorting, processing, re-packaging and (where possible) re-selling the product. Resources used include people, warehouse space, mechanical handling equipment and a variety of transportation vehicles all requiring energy. In two of the five case study companies, returns from all over the world are consolidated in a distribution centre in Sweden, sent by truck to a sorting centre in Eastern Europe and then brought back to Sweden to be re-sold. Specifically, one company sent 3 full semi-trailer loads of returns for processing per week to Poland and received 2 semi-trailer loads back with returns and another company sent all their returns to Estonia using the national carrier which consolidated other goods into the vehicles. This off-shoring is recognised by the retailers to be environmentally problematical but is carried out purely for cost reduction purposes.

4 Sustainability improvements and digitalisation.

The solutions discussed below have emerged from the discussions with the retailers and distribution companies as well as from the literature. They are divided into two categories; first, reducing the number/rate of returns to start with and second, making the reverse logistics process more efficient.

4.1 The role of digitalisation in reducing the number/rate of returns

4.1.1 Digital changing rooms

As outlined above, customers make returns for various reasons, including incorrect sizing and failure of the image on the website to properly represent the actual product so that a difference exists between what the customer perceives on the website and the product in reality. Digitalisation can reduce this gap through developments such as virtual changing rooms and other augmented reality apps in which customers can input their measurements and other key body descriptors. The use of avatars or similar can then help the customer with sizing whilst at the same time showing an image of what the clothing item looks like on them and even how it combines with other elements of their wardrobe. Once customer data has been stored, the company can then target customers individually with clothes

that they think might be suitable for them, providing personal, customised shopping. Some companies are also pioneering virtual reality changing rooms where the customer can even 'touch' and 'feel' the product and can discuss the product with friends through social media. Webpages can be tailored to individuals promoting styles and sizes based on a customer's previous shopping habits making it less likely that items will be returned.

4.1.2 Social media

Social media is a direct outcome of digitalisation. It has brought about unprecedented connectivity, transparency and communication between all sorts of social and business networks enabling the sharing of information, opinions and ideas. Generation Y, the digital natives who use social media as a matter of course, have had and continue to have a massive impact on the consumer's buying behaviour. However, social media can be used by companies in a variety of ways to reduce returns. By communicating with customers via social media, products can be described more personally and realistically. In addition, companies monitoring social media can view how their products are being perceived by their customers. If a product is continuously being described as being wrongly sized or badly made, it gives the retailer the opportunity to address such problems on the website by changing either the image or the description of the product to more accurately reflect it. If an item has a great many 'dislikes', it gives the company the opportunity to determine why.

4.2 Improving the efficiency of reverse logistics

4.2.1 Apps

All manner of apps now exist; some more useful than others. As alluded to above, apps can be used by companies to improve the quality of information provided to customers so that returns can be reduced. Parcel tracking apps can provide the customer with real-time information about when their return parcel will be picked up by the parcel carrier. This should reduce the number of failed pick-up calls by parcel carriers, thereby improving sustainability. Some companies are providing customers with apps linked to smart devices which will enable parcel carriers to access locations at people's homes using PIN codes to enable them to

pick up returns parcels. The complication with making the returns process more reliable and convenient for the customer is that it could actually stimulate them to make more returns!

4.2.2 Electronic data interchange (EDI)

EDI has a big part to play in improving the efficiency of reverse logistics. EDI has been used in logistics operations for a long time. It is essentially EDI which has enabled the globalisation of logistics. EDI is becoming increasingly sophisticated as it develops and evolves. In conjunction with Application Programming Inter-faces (APIs) applications can be built enabling previously proprietary, sometimes bespoke, legacy based software programmes to communicate with each other. EDI provides end-to-end visibility of the return enabling monitoring and track and trace. Such digital transformation enables functionality between different channels and thus important collaboration between partners in the chain. Used properly, it allows companies to fully exploit both internal and external communications and integration processes. As has been discussed above, the journey taken by a returned item is quite complex, involving both the consumer and the parcel collection company. Additionally, during much of this journey there is little product visibility, making stock control difficult. Improving the quantity and quality of this information could mean fewer wasted resources in terms of product and resource use.

A combination of EDI and barcodes can enable swifter turnarounds and improved lead time. It has the potential to radically alter the returns process. With such systems, retailers with physical stores will have cross-channel connectivity, enabling products ordered online to be returned in-store (and maybe vice-versa). Customers can then be refunded immediately and stock control systems will be able to take these returns into account enabling the movement of physical flows of goods to be reduced.

In another possible development being discussed, for goods ordered online rather than items being returned to the retailer, customers could be able to send their return item direct to the next customer, thus becoming a C2C transaction and reducing hugely the resources used in the reverse logistics process. In this case, the initial customer would be sent (electronically) a barcode label to print out and stick onto the return packaging which would allow that package to be re-directed to the next customer. As long as the parcel carrier was part of the EDI system, the parcel could be intercepted from its normal returns journey. This type of system

obviously requires a degree of trust between customers and may not be possible, but with appropriate customer profiling or similar, it could work with at least a proportion of returns.

Parcel carrier routing and scheduling can also be hugely improved with the use of appropriate digitalisation applications. As with the last mile in the outward, delivery direction, the sustainability of the first mile in the reverse logistics process is increased as the pick-up density increases. Routes can be planned to maximise pick-up densities and these can be improved using real time information provided initially by the customers. This is equally applicable where the customers are individuals or business customers advising on pick-ups from collection points. Although maybe a little less immediately possible due to competition issues, different parcel carriers should also be able to communicate to work together in this sphere, obviating the duplication of trips and thereby improving sustainability.

Digitalising the whole of the returns flow can enable swifter processing of the returns when they arrive back at the (r)e-tailers warehouse. The sorting process is very labour intensive and often requires several separate computer inputs by the sorter(s). One of the case study companies had speeded up the process considerably through the use of hand-held scanners, which both improved the accuracy of the information, speeded up the sorting process and also the speed in which the goods were able to be added back into the stock-keeping system.

4.2.3 Radio Frequency Identification (RFID)

RFID can play a part in improving the efficiency of the reverse logistics process by enabling the (r)e-tailer to track and identify the returning parcel much more quickly. Companies obviously want to re-sell as many of the returns as possible and the higher proportion they re-sell, the greater the sustainability (assuming that disposal is the least sustainable option). Item tracking and identification can help in many parts of the process, but an example from one of the case study companies may highlight an unexpected benefit. When the returns for this company arrive back at the warehouse, they are delivered in cages, each of which holds around 500 parcels. The retailer knows the contents of the cage as a whole, but if it is seeking to re-send one particular item to a new customer, it has to find that item in the cage. This can take a long time as all the parcels will need to be searched. If RFID tags were used, the item could be found much more quickly, using fewer resources. None of the case study companies used RFID tags as they

were deemed to be insufficiently sensitive and robust and were too expensive, but this is likely to change in the future as RFID technology improves

4.2.4 Customer Profiling

Customer profiling in a manner suggested by Hjőrt et al. (2013) can also be facilitated by EDI. Hjőrt et al argue that customers should be charged differentially for returns according to their past returns behaviour and their ordering profile, so that a customer who serially returns items whilst purchasing only a very small percent of the items they order would pay more for returns than a customer who returns only a very small proportion of their orders or who buys a lot from the company. Only two of the case study companies had any idea of their customer's returns profile.

4.2.5 Packaging

Although perhaps a minor aspect in terms of the sustainability of reverse logistics, packaging is nevertheless important. At present, many (r)e-tailers include in their package a pre-printed return label and a form asking for information about why the item is being returned. Several of the case study companies were considering replacing these with a downloadable digital version to be printed out by the customer in the event of them wanting to make a return. This saving of paper improves the sustainability of the process, albeit probably only very slightly.

4.2.6 Discussion

Whilst some of the digitalisation possibilities discussed above offer relatively quick and definite benefits, others are potentially very expensive and at the same time very risky. Clothing returns are nothing new, but the VOLUME of returns is comparatively new and companies are struggling to know how best to deal with the issue and which route to, and form of, digitalisation is best for them. The new 'pure' e-tailers have almost been established with digitalisation at their core, as part of their business model; the mixed (r)e-tailers have so many alternative courses of action that choosing between them is almost impossible and getting it wrong can be VERY costly. Implementing new computer systems of any sort is fraught with difficulties as well as being very expensive. All of the personnel

that we interviewed in the case-study companies said that dealing with returns was a very high level of priority for them as the cost of dealing with them was so high and the potential loss of customer orders if they got it wrong was also high. They all admitted that they were daunted by future and a little 'lost' as to the next moves to take.

5 Summary and Conclusions

This paper has sought to show how digitalisation can improve the sustainability of the reverse logistics of clothing. We have only just scratched the surface of this issue and there are likely to be many more developments. Developments in augmented and virtual reality improve the visualisation of the clothing products being bought online and may also be able to improve other important aspects such as the 'feel' of a product. These developments may reduce the number of returns made by consumers. However, we must also bear in mind that processes that make returns easier, and even processes that make online shopping easier and more reliable, might actually increase the number and rate of returns. It might be that at the end of the day, if we really want to reduce the number of returns we actually have to appeal to people's sense of environmentalism to simply not return as many goods as they are currently doing. This could be done by making them more aware of the sustainability issues involved. Somewhat contradictorily, however, as returns increase, it could be argued that on a per parcel basis, sustainability improves as generally higher parcel consolidation and reduced parcel flow fragmentation is positively correlated with sustainability. EDI and other digital developments can assist in this domain.

In summary, it is likely that combining digitalisation measures to reduce the number of returns with those aimed at improving the efficiency of the reverse logistics process will be required to improve the sustainability of reverse logistics operations in cities and elsewhere.

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