Chapter 13
Towards Closed-Loop Fashion Supply Chains—Reflections from Retailer-Facilitated Used Apparel Collection Programs

Pui-Sze Chow and Cinty K. Y. Li

Abstract The fashion industry is one of the largest polluters in the business sector. Apart from the pollutions incurred during the production process, clothing disposal and landfill problem also impose a great problem to the environment and the situation has become increasingly adverse with the tremendous number of clothing being disposed every year. Many disposed garments are in fact in good condition that can be reused or they can be recycled into useful raw materials. The idea of closed-loop fashion supply chains has started to draw the attention in the industry. To achieve this, nevertheless, effective collection of post-consumer products is critical. In recent years, a number of fashion companies have been launching programs to collect used clothing from customers. The collected items are resold or donated as second-hand clothing, or are recycled into fibers or fuels, depending on their conditions. Based on secondary data, this study examines the used apparel collection (UAC) programs of four fashion retailers, namely: Fast Retailing Co., Ltd. (Uniqlo), Patagonia, Inc., Eileen Fisher Inc., and Hennes & Mauritz (H&M). It discusses the features and the advantages of these retailer-facilitated UAC programs.

Keywords Retailer-facilitated used apparel collection programs · Closed-loop fashion supply chains · Sustainability

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13.1 Introduction

The fashion industry is the second largest polluting industries (EcoWatch 2015). The mounting volume of garment ended up in landfill was a direct consequence of the popularity of fast fashion, or cheap, disposable clothing. Americans now bought five times as much clothing as they did in 1980. Between 1999 and 2009, textile trash volume increased by 40% in America, particularly due to the emergence of cheap, disposable clothing (Cline 2014). In the United States, the average Americans recycled or donated only 15% of their used clothing. The remainder— about 10.5 million tons a year—went to landfills. In New York City, clothing and textiles made up 6% of all garbage (Cline 2014). A survey on 7950 UK adults found the average person estimated that they own £1800 worth of clothing in which 30% had not been worn during the past year, mostly because they did not fit anymore. Every year, 350,000 tons, or an estimated 31%, of end-of-life clothing, went to landfill (WRAP 2016).

Dumping used garment in landfill might solve the space problem in one's home, but it did not help the environment: sitting in the landfills, used t-shirt and pants decomposed and released landfill gas, a brew of toxic air pollutants that included carbon dioxide and methane. According to the American Environment Protection Agency, landfills were the third largest source of methane emission in the US. Methane was 28 times more efficient than carbon dioxide in trapping heat, thus contributing to global warming (Freeman 2016). Other garments made from synthetics were designed not to decompose. Even during production, synthetics released nitrous oxide, which was a much more potent greenhouse gas than carbon dioxide, absorbing as much as 270 times more heat. Lying in the landfill, synthetics might release toxic substances into groundwater and the surrounding soil (LeBlanc 2016).

Before they ended up in landfill, some garment could be repaired, reused, resold, or recycled into rags or insulations, if not incinerated. Donation to charities, or giving to friends and family are some common ways for consumers to dispose their unwanted clothing (Bianchi and Birtwistle 2012). Whereas donating used garment to charities might alleviate some of the clothing congestion in one's wardrobe, charities has started facing problems to deal with the ever-increasing volume of donated clothing. Accoring to the interviews with charity shop managers in UK, the sell-thru rate of the donated clothing was around 50–70% in general (Birtwistle and Moore 2007). Charities in US such as Goodwill and the Salvation Army could only sell what they could in their retail shops—typically less than 20% of what they received. For the remainders, they called for-profit textile recycling companies, like Viltex, who bought the leftover clothes by the pound and recycle them (Cline 2014). In 2013, Americans recycled 2.3 million tons of textiles which reduced greenhouse gases equivalent to taking 1.2 million cars off the road for a whole year (Freeman 2016).

In recent years, fashion companies began to reflect whether affordable and trendy fashion, although highly profitable, could strike a balance with ethical issues such as environmental sustainability, when global warming and carbon emission became a hot topic. Some of them started to factor in sustainability in their business

model. To reduce waste and preserve the environment, some advocate closing the textile loop by recycling clothes. To achieve this, nevertheless, effective collection of post-consumer products is critical. To make reverse logistics on a larger scale to close the loop of the apparel supply chain, perhaps international players in the fashion industry could be more effective.

Over the past two decades, a number of fashion companies have been launching programs to collect used clothing from customers. Based on their conditions the collected items are resold or donated as second-hand clothing, or are recycled into fibers or fuels, thus extending their product lives and reducing waste. This study examines the used apparel collection (UAC) programs of four fashion retailers, namely: Fast Retailing Co., Ltd. (Uniqlo), Patagonia, Eileen Fisher, and Hennes & Mauritz (H&M). These four companies are pioneers and representatives in operating used apparel collection programs. Secondary information about their UAC programs, as well as other sustainability initiatives, is available from various sources, such as company websites, reports and news. This study aims to provide an overview of the current practices of the retailer-facilitated UAC programs as well as discuss implications from these industrial cases on the features and the merits of retailer-facilitated UAC programs.

The organization of this chapter is as follows: Sect. 13.2 reviews the various concepts related to UAC. Section 13.3 presents the different cases of retailer-facilitated UAC programs currently observed in the industry. Section 13.4 discusses the various features of retailer-initiated UAC programs with respect to the business natures of the involved fashion retailers and the benefits of retailer involvement in UAC. Finally, Sect. 13.5 concludes the chapter and suggests future research directions on the topic.

13.2 Literature Review

UAC is closely related to the topics of the 3R concept, closed-loop supply chain management, and recycling in the fashion industry. We briefly review some of the influential and recent literature as follows.

13.2.1 The Concept of 3R "Reduce, Reuse, Recycle"

The notion of 3R—"Reduce, Reuse, Recycle"—is popular and fundamental in waste management. Its earliest documented origin may be traced back from the United States in the 1970s when it was mentioned in De Bell (1970) and appeared as a slogan for various environmental campaigns during the time. Essentially, the 3R concept encourages people to reduce the use of resources and waste, to reuse items for different purposes, to recycle items to reusable forms or as raw materials for new products. Later, Joshi et al. (2006) extend the 3R concept to the 6R concept from the life cycle assessment perspective by including three more factors, namely: Recover, Redesign,

and Remanufacture. Recover refers to the treatment of used items for further utilization such as used-product collection, disassembly, sorting and cleaning. Redesign involves the adoption of innovative techniques to make products more sustainable. Remanufacture focuses on converting used items or components into usable conditions whilst preserving the original functionality. Similarly, Esty and Winston (2009) extend the 3R concept to the 5R pollution prevention hierarchy by adding two levels, namely: Redesign and Reimagine. The former concerns the use of materials and processes for environmental friendly production whilst the latter involves invention and introduction of green products. Since then, different versions of 5R and 6R have been proposed by different organizations or people under different contexts. Under the domain of fashion supply chain management, Ho and Choi (2012) analyze the sustainability aspect of four apparel companies in Hong Kong with reference to the 5R framework of Esty and Winston (2009). With reference to this study, UAC programs aim to fulfill the 3R concept by reusing and recycling the apparels collected so as to minimize waste and reduce the use of resources.

13.2.2 Closed-Loop Supply Chains and Reverse Logistics

A closed-loop supply chain (CLSC) involves dynamic recovery of the values from different components of a product over time (Guide and Van Wassenhove 2009). With the increased attention and demand for sustainable business practices, a vast amount of research has been devoted to CLAS management. Atasu et al. (2008) review a series of closed-loop supply chain research from the business economics perspective. Govindan et al. (2015) conduct a taxonomy of the scientific journal papers in the field of reverse logistics and CLSC management and suggest future research directions. We refer readers to these excellent review papers in the development of the subjects.

The process to take back used products from consumers for recovery plays a critical role in effective CLSC management. Reverse logistics is "*the process of planning, implementing and controlling flows of raw materials, in process inventory, and finished goods, from a manufacturing, distribution or use point, to a point of recovery or point of proper disposal*" (De Brito and Dekker 2004). It involves four main activities, namely: acquisition and collection of post-consumer products, inspection and grading, processes for value recovery, and redistribution (Fleischmann 2001). In the fashion industry, Sas et al. (2015) study carpet recycling in the US and discuss the challenges and concerns for the design and organization of the collection and recycling network. The authors emphasize the need to identify new markets for recovered carpet materials, development of new recycling techniques, and proper reverse network design are critical to advance product recovery effectiveness.

The choice of the leader in a CLSC can make vast impact on its performance. Choi et al. (2013) investigate the effect of channel leadership on the performance of a CLSC with the retailer, the collector, and the manufacturer as a possible leader. They analytically show that the retailer-led CLSC is the most effective CLSC

structure as it results in the highest supply chain profit and product return rate. On the other hand, Gao et al. (2016) suggest that channel power structure and consumers' response to the collection effort are critical factors for the effectiveness of a CLSC with single retailer and single manufacturer. Specifically, the authors found that if the demand are less sensitive to the manufacturer's collecting effort activities (such as product design towards recycle and reverse logistics services), the CLSC is optimal and consumers are benefited by the lowest retail price when neither the manufacturer or the retailer has the dominant power over the CLSC. Otherwise, CLSC with the retailer being the channel leader performs the best. Apparently, the results of the above literature lack justification from real-world examples. In the fashion industry, for example, UAC is an important process for closed-loop fashion supply chain management. Whether similar results apply to UAC program leadership may need further investigation.

13.2.3   Remanufacturing and Recycling in the Fashion Industry

Despite the urgent need and its huge potential, the development progress of apparel recycling is comparatively slow. Larney and Van Aardt (2010) identify a lack of demand for recycled apparels, insufficient equipment and technology, and high cost as some of the obstacles to make apparel recycling cost-effective. A number of research studies are thus conducted to investigate this issue. For instance, Larney and Van Aardt (2010) empirically examine the practices of fabric waste disposal by the apparel manufacturers in South Africa and their perception towards recycling. The study suggests that increased consumer awareness and knowledge of recycled apparels could help ensure a market and encourage apparel manufacturers to recycle more extensively. Abraham (2011) investigates the reverse logistics of the apparel aftermarket in India. The author contends that collaboration amongst members in the reverse logistics chain could help enrich market knowledge, reduce market uncertainty and improve profitability. Curwen et al. (2012) study the challenges of sustainable apparel development in the fashion industry through the case of Eileen Fisher, a designer label in women's wear. The authors identify that a clear mission, strong company authorization, and like-minded suppliers are some critical factors to successful development of sustainable apparels. Laitala and Klepp (2015) discuss the benefits of clothing recycling and reuse to the environment and investigate the clothing disposal habits of people in Norway based on a wardrobe study and a survey. Payne (2015) examines the open-loop recycling and closed-loop recycling of textile products with reference to the frameworks of life cycle assessment and life cycle thinking.

In view of the above literature, UAC programs play a significant role in retrieving values and extending the lives of apparel products. Recently, retailer-facilitated UAC programs have become a popular green initiative for many

fashion retailers. Yet apparently there is a lack of study systematically examine the different formats of these programs. How fashion retailers' facilitation affects the implementation and the effectiveness UAC programs remains unknown. This chapter therefore aims to shed light on the answers to the following questions: (a) What are the different approaches of the UAC programs currently practiced by the fashion retailers? (b) How are the different features of the UAC programs related to the business nature of the involved fashion retailers? and (c) What are the merits of retailer-facilitated UAC programs?

13.3 Examples of Retailer-Facilitated Used Apparel Programs

In this study, the UAC programs of four fashion retailers are examined, namely: Fast Retailing Co., Ltd. (Uniqlo), Patagonia, Eileen Fisher, and Hennes & Mauritz (H&M). Table 13.1 summarizes the profiles of these companies and their respective UAC programs.

13.3.1 Fast Retailing Co., Ltd. (Uniqlo)[1]

Established in 1963 in Japan, Fast Retailing Co., Ltd. (Uniqlo) is the third largest fashion retailer in the world. It adopts an SPA (Specialty store retailer of Private label Apparel) business model that monitors the production process from design through manufacture to retail. Apart from operating multiple brands including Uniqlo, GU, Theory, and Comptoir des Cotonniers, the company also develops functional materials like HEATTECH for thermo wear and AIRism for quick-dry innerwear (FR annual report 2015).

Uniqlo began its Fleece Recycling Campaign in Japan in 2001 as part of its corporate social responsibility activities. The project expanded to include all Uniqlo branded apparel in 2006 and was renamed as the All-Product Recycling Initiative. Originally the Initiative was conducted in March and September every year in Japan restricted to Uniqlo branded apparel. Starting from 2010, it has become a year round activity which also included fashion products from GU, another brand operated by the company. Since 2011, the company has been extending the Initiative to markets outside Japan, such as South Korea, France, the UK, the US, Hong Kong, and Shanghai, China.

The original objective of the Initiative was to recycle collected apparel into industrial textiles and fuel. Having observed that most of donated garments (around 90%) were still in good condition, the company shifted the theme of the campaign

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[1]Main source of reference: http://www.fastretailing.com/eng/csr/community/recycle.html.

Table 13.1 List of fashion companies with apparel collection and recycle programs examined in this study

	Company profile					Used apparel collection (UAC) program		
	Company name	Product type (s)	Headquarter	Market (s)	Number of owned stores (as of 2015)	Start year	Main brand (s) involved	Items covered
1	Fast Retailing Co., Ltd. (Uniqlo)	Private label apparel	Japan	17 countries and regions	Over 2900	2001	UNIQLO, GU	All UNIQLO and GU branded items
2	Patagonia Inc. (Patagonia)	Outdoor apparel and gear	US	18 countries and regions	68	2005	Patagonia	All Patagonia items
3	Eileen Fisher, Inc. (Eileen Fisher)	Designer label fashion	US	US, UK, Canada	Over 60	2009	Eileen Fisher	All items from own brands
4	Hennes & Mauritz (H&M)	Fast fashion	Sweden	61 markets worldwide	Over 3600	2013	H&M	Apparels from any brands and any textiles

from recycling to reuse. In collaboration with the United Nations High Commissioner for Refugees (UNHCR) and local nongovernment organizations (NGOs), Uniqlo distributes donated clothing that are still wearable to refugees, homeless people and victims from natural disasters and humanitarian crises. The remaining garments that are not in wearable condition (around 10%) are recycled into industrial fibers or energy fuel.

Customers can return the unwanted Uniqlo and GU garments at the recycle boxes available in the stores of the two brands where the Initiative covers. Then, the collected garments are inspected and classified into wearable and non-wearable items according to their conditions. Wearable donated clothing is sorted based on season, gender and product type. Appropriate apparel is then selected and distributed to the refugees, homeless people, and victims from natural disasters and humanitarian crises with collaboration of UNHCR and local nonprofit organizations.

In October 2015, to mark the 10th anniversary of the All-Product Recycling Initiative, Uniqlo partnered with UNHCR to launch the 10 Million Way to HELP Project. The project aimed at collecting ten million clothing items for refugees worldwide. With the cooperation of partner companies, schools and educations institutions, and various community groups, the company successfully completed the target within 6 months and benefited needy people in countries such as Uganda, Nigeria, and Liberia (Fast Retailing Co., Ltd. 2016).

As of August 2015, the All-Product Recycling Initiative has been collecting 39.5 million apparel items at Uniqlo and GU stores in 16 countries and regions, over 16.3 million of which were donated to refugees and displaced people in 59 countries and regions.

13.3.2   Patagonia Inc. (Patagonia)[2]

Patagonia is a US-based company in outdoor clothing and gear founded in 1973. Its mission is to "build the best product, cause no unnecessary harm, use business to inspire and implement solutions to the environmental crisis". With its origin closely related to climbing and outdoor activities, the company has a strong emphasis on environmental sustainability. It has stringent policies to monitor its businesses to ensure its production process and operations create minimal impacts to the environment. The company has been the winner of different sustainability-related awards for many years. For instance, it has won the Accenture Strategy Award for Circular Economy Multinational 2017 for its "long-track record of sustainable innovation in the industry" (the other winner of the award being Nike) (Covello 2017).

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[2]Main source of reference: http://www.patagonia.com/reuse-recycle.html.

Patagonia is perhaps the first company to operate a global recycling program for apparel (Green 2008). The company launched the Common Threads Garment Recycling Program in Fall 2005 with the goal to make all its products recyclable in five years' time. As an important component of the program, Patagonia invited customers to return used or unwanted products of the brand for recycling. Customers could donate their clothing by dropping them at the company's retail stores or selected dealers, or they could mail them to the company's service center at Reno, Nevada. Through the reverse logistics system established by the company, collected garments were sorted according to the quality and the types of materials before sending to designated fabric manufacturers for recycling. At the beginning of the program, owing to the recycling technology constraint, only Capilene® garments of the company were collected and TEIJIN, a Japanese fabric manufacturer, was the sole recycler. In 2007, the types of garments collected were expanded to include 100% cotton T-shirts, Patagonia fleece and Polartec® fleece from any brand. More fabric recyclers were involved in the program, including Calami and Toray (Patagonia 2009). A total of 45 tons of garments were collected through this program, 34 tons of which were made into new clothing (Patagonia 2011).

In 2011, Patagonia launched the Common Threads Initiative which incorporated the 5R concept: reduce, repair, reuse, recycle, and reimagine (Patagonia 2011). Extending the practices of the Common Threads Garment Recycling Program, the company collected all types of worn-out Patagonia garments from the customers for recycling into fabric or fiber, or for repurposing for other use. In addition, to enhance the reusability of the company's used products, Patagonia encouraged customers to donate unused clothing to charity or sell them to someone who needed them. For the latter, the company had collaborated with eBay for a period of time to establish the Patagonia Common Threads Initiative storefront on eBay. Customers who had taken the pledge to join the Initiative were entitled to list their unused products on eBay as well as the Used Clothing & Gear Section on the company's website.

In 2013, the company launched the Worn Wear™ program under which customers could trade in their used Patagonia apparels at four of the brand's outlets in the US including Portland, Seattle, Palo Alto, and Chicago (Patagonia 2013). For each returned item that had been checked under good condition and clean, customers could earn trade-in credit valued at half of the price of the item, which could be redeemed for purchase in store or online at the company's website. The collected apparels will be sold through the Common Threads Worn Wear section in the respective stores. On Black Friday 2014 the company collaborated with the sharing app Yerdle to operate the all-day Patagonia Worn Wear Swap campaign (Simpson 2014). Customers could bring in their used Patagonia clothing at eight of their retail stores in the US in exchange of another piece of used clothing brought by others, or they could redeem Yerdle credits that could be used for purchase of any second-handed items available on the app.

As of 2016, Patagonia has been recycling over 95 tons of the apparel.

13.3.3   Eileen Fisher[3]

Founded in 1984, Eileen Fisher is a US designer label of women's wear. The company has been devoted to environmental protection and human rights, in particular those for women and girls. In 2015, the company announced its Vision 2020 campaign outlining its five-year plan towards the goal of 100% sustainability (Eileen Fisher, Inc. 2015).

In 2009, the company launched Green Eileen, a recycled clothing initiative that collected, sorted, and resold gently worn clothing of the company in the US. After cleaned and repaired whenever needed, the collected clothing was resold at the brand's Green Eileen stores, LAB stores and workshop centers. For items that could not be resold, Green Eileen operated various workshops through which the fabrics and materials were upcycled into other items. At first, the collected clothing was sold in the company's LAB store, a concept shop in Irvington, New York, where both current collection and donated clothing was displayed together. With the increasing number of donation, Green Eileen opened its first own store in 2011. To date, the collected clothing is available for sale in two Green Eileen stores in Irvington and Seattle as well as a few retail shops of Eileen Fisher.

Customers were encouraged to bring back their gently worn Eileen Fisher clothing at any of the brand's retail stores or the two recycling centers in the country. In return they were given a US$5 reward card for each donated item, which can be redeemed for purchase at any of the company's retail stores as well as online portal. Being a nonprofit, Green Eileen used all the profits from the recycled clothing to support charities and programs for women, girls and the environment. Some of the tuition fees from the workshops were also for donation to the Eileen Fisher Community Foundation.

Starting from summer 2016, the company operated the Remade in the USA program, a social innovators project in collaboration with the Council of Fashion designers of America (CFDA), under which defective clothes collected from the recycling program will be remade into new clothes for sale.

Since the start of the Green Eileen initiative in 2009, over 600,000 Eileen Fisher pieces of apparel have been collected, around 200,000 of them were successfully resold. The company expects the recycling items can reach one million by 2020.

13.3.4   Hennes & Mauritz (H&M)[4]

Started in 1947 as a women's wear store in Sweden, H&M is the second largest fashion retailer in the world. The fashion group operates physical stores of six

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[3]Main source of reference: http://www.greeneileen.org/.

[4]Main source of reference: http://sustainability.hm.com.

brands (H&M being the main brand) in 61 countries and regions and online portals in 23 markets worldwide. Apart from fashion for women, men and kids, the group is also involved in cosmetics and skincare, as well as home accessories under the brand of H&M Beauty and H&M Home (H&M 2015).

H&M's business idea is "to offer fashion and quality at the best price in a sustainable way" (H&M Annual Report 2015, p. 12) and its ultimate goal is "to make fashion sustainable and sustainability fashionable" (H&M Conscious Actions Sustainability Report 2015, p. 6). In 2010, the group introduced the H&M Conscious program under which a series of actions was taken to achieve its seven strategic commitments on sustainability. One of such commitments includes the group's pledge to "reduce, reuse, recycle" (H&M Conscious Actions Sustainability Report 2010). In the long run, H&M aimed at closing the loop on textile fibers by making new garments from the old ones (H&M Conscious Actions Sustainability Report 2012). To do so, the group partnered with I:COLLECT (I:CO), a global textile and footwear recycling solution provider, to pilot a UAC scheme in 17 H&M stores in Switzerland in 2011 (H&M Conscious Actions Sustainability Report 2011). Later on, the group formally started the UAC program in 2013 under which H&M was responsible for apparel collection from end customers whereas I:CO for the subsequent sorting and recycling arrangements.

H&M is the first fashion company that introduces a global UAC program with no restriction on the brand, the type, or the condition of the collected textiles products (I:CO 2012). Customers could drop their unwanted apparel and even used home textiles—of any brand and in any condition—into a green collection box located next to the cashier in an H&M store. As an incentive, for each bag of unwanted textiles collected, H&M offered to the contributing customers a voucher which could be redeemed for next purchase at H&M. Afterwards, I:CO picked up the collected textiles using the group's existing logistics system and sent to designated sorting facilities where items were hand sorted and graded (I:CO, n.d.a). Based on their condition, collected items were resold as second-hand clothing, reused as textile products like cleaning cloths, recycled into textile fibers or insulation materials, or used as fuel for energy production. Amongst all the collected items, it was estimated that 40–60% could be re-worn as second-hand garments, 5–10% could be reused as other textile products, 30–40% could be recycled into textile fibers or insulation materials, with the remaining 1–3% of them for thermal utilization (World Economic Forum 2014).

As part of the arrangement with I:CO collaboration, H&M sponsored the H&M Charity Star project depending on the amount of garments collected. Specifically, for each kilogram of garments collected, H&M donated 0.02 Euro to a chosen local charity organization such as UNICEF, Red Cross, and Save the Children. Besides, the group also donated all surplus obtained from the UAC program to the H&M Conscious Foundation, which funds research and innovations on closed-loop technology.

Since the start of the UAC program in 2013, the number of collected clothing has been constantly growing every year. As of 2015, it has collected over 23 tons of

garments. Currently, the program is available in almost all H&M stores (except a number of stores in franchised markets), as well as selected stores in other affiliated brands operated by the group, such as &Other Stories, Weekday, and Monki.

13.4 Discussion and Implications

13.4.1 Features of Current Retailer-Facilitated UAC Programs

Table 13.2 summarizes the different formats of the four retailer-facilitated UAC programs under study.

In the following, we discuss the possible underlying rationales for these different approaches.

13.4.1.1 Choice of Recycling Partners

Different fashion retailers have different choices on the recycling partners to operate their UAC programs and such decision may be related to their business models. For

Table 13.2 Summary—different approaches of the retailer-facilitated UAC programs under study

Feature	Approach	Adopting fashion retailer(s)
Choice of recycling partner(s)	Fabric/clothing suppliers	Patagonia, Uniqlo
	Third-party recycling solution provider	H&M
	Recycling/Upcycling handled by itself	Eileen Fisher
Types and brands of the clothing collected	Restricted to own branded and specific types of products	Eileen Fisher, Patagonia, Uniqlo
	Textile products of all brands and types welcome	H&M
Outlets for the clothing collected	Reuse—sold as second-hand clothing	Eileen Fisher, H&M, Patagonia
	Reuse—donated to the needy	Uniqlo
	Recycle—as fabrics, industrial textiles or fuel	H&M, Patagonia, Uniqlo
	Upcycle	Eileen Fisher
Incentive for customer participation	Monetary incentive provided	Eileen Fisher, H&M, Patagonia (for specific campaigns only)
	No monetary incentive provided	Patagonia, Uniqlo

instance, Patagonia works closely with its fabric suppliers (such as TEIJIN, Toray) for the recycling whereas H&M collaborated with the third-party global recycling solution provider I:CO for its UAC programs. Being an established retailer in outerwear and gear, Patagonia has been researching and developing new textile technology with specialized functionality. It also has a strong long-term relationship with its suppliers in development and production of functional materials for its products. Both parties would have the related expertise in the fabrics and materials of the collected products and may help enhancing the recycling effectiveness. Besides, the long-term relationship could also facilitate smoother coordination of the reverse logistics and recycling arrangement between the fashion retailer and the suppliers. By contrast, H&M does not operate any manufacturing facilities. Its UAC program leverages the large business scale of the fashion retailer in enhancing the collection capability as well as the expertise and knowledge of I:CO in subsequent sorting and recycling processes. Eileen Fisher, on the other hand, manages its UAC program mostly by itself. Being a designer label which emphasizes quality and style, Eileen Fisher operates its UAC program with the main focus on the reusability of its gently worn collected clothes as second-hand apparel. Delicate sorting of the collected items by style and seasonality would be required to match with visual merchandising and selling in store. Trained personnel within the fashion retailer who are familiar with the designer label would be more appropriate in dealing with the tasks.

13.4.1.2 Restriction on Brands and Types of Garments Collected

Almost all four fashion retailers, except H&M, collect used garments from their own brands only. At the initial stage of their UAC programs, Uniqlo and Patagonia even restricted to collecting specific types of their products (e.g. fleece for Uniqlo and Capilene® garments for Patagonia). The use and complexity of blended materials has always been one of the greatest obstacles to recycling apparel and textile products (Muthu et al. 2012). Being involved in the design and development processes, individual fashion retailers have the best understanding about the composition of their own products. They could provide useful information with recyclers on the proper handling of the collected items to achieve maximum recycling capability. Besides, the specific apparels collected can be recycled and become the input of the similar types of products, thus enabling formation of a closed-loop fashion supply chain.

13.4.1.3 Outlets for the Clothing Collected

Collection of used apparel products is an important procedure to close the loop of the fashion supply chain. With proper sorting and treatment, a majority of the

products collected from the UAC programs will have the product lives extended either in the form of second-hand products for reuse, fabrics and industrial textiles after recycling, or new textile products with upcycling. A small portion of the collected items which quality fall below the requirement are recycled into fuel. Amongst the four fashion retailers, Patagonia and Uniqlo actively participate in the sorting and handling of the clothing collected from their UAC programs whereas Eileen Fisher handles all the processes involved in its UAC program by itself. For Patagonia and Uniqlo, the relationship with their designated suppliers is relatively close as they actively work with their suppliers in textile technology and product development. Some of their products are designed and developed to facilitate recycling into raw materials for production of similar apparels of their own brands. Eileen Fisher, on the other hand, emphasizes durability and sustainability of its apparels in terms of the quality and the design. The collected clothing of the designer brand is thus largely in good condition for reuse. The relatively smaller scale of operation also justifies the management of the UAC programs by the designer brand alone. H&M, by contrast, is the only one that does not involve in the treatment of the collected clothing. Collaborated with a third-party recycling solution provider, H&M mainly focus on how to enhance the collection capacity of its UAC program. It would be more effective for the professional third-party recycler to handle all the recycling activities while the fast fashion brand can leverage its extensive retail network and marketing approaches to enhance the collection capability.

13.4.1.4 Incentive Provision for Clothing Donation

Amongst the four fashion retailers studied, Eileen Fisher and H&M provide monetary incentive (in the form of redeemable vouchers for next purchase) for end customers to deposit used clothing to their UAC programs. By contrast, Patagonia and Uniqlo consider it as the responsibility and discretion of end consumers to properly handle their apparel after end-of life. It is generally agreed that consumer behavior plays a significant role in dealing with environmental issues of fashion products. Which of these two approaches could enhance the effectiveness of retailer-facilitated UAC programs is an interesting question and deserves further investigation.

13.4.2 Merits of Retailers' Facilitation on UAC Programs

Reverse logistics arrangement and development of markets for remanufactured products are some of the challenges to achieve closed-loop supply chains (Seitz and

Peattie 2004). From the above industrial cases, it is observed that retailer-facilitated UAC programs can help tackle these challenges in a number of ways as follows.

13.4.2.1 Fashion Retailers as Effective Post-consumer Waste Collectors

Collection of post-consumer waste from individual consumers is one of the great challenges for closed-loop supply chains (Payne 2015). Savaskan et al. (2004) analytically examine the effectiveness of different closed-loop supply chain structures in terms of investment in used-product collection effort and supply chain profit. Their analysis suggests that having the retailer as the collector for used products is the most effective scenario. Whereas nonprofit organizations like Oxfam and Salvation Army list on the top when people think of clothing donation, fashion retailers could also be a facilitator in the collection process as demonstrated by the UAC programs studied above. Several studies have reflected that convenience is one of the crucial factors for clothing donation and disposal (Ha-Brookshire and Hodges 2009; Joung and Park-Poaps 2013; Laitala and Klepp 2015). With the gigantic network of retail outlets, fashion retailers can provide ease of access and time-saving solution for end consumers to drop off unwanted clothing from end consumers. Besides, the existing logistics system could also help for establishing the reverse logistics system for the collected post-consumer apparel items. Moreover, bulk shipment of collected garments from fashion retailers to recycling facilities could also reduce delivery frequency and in turn reduce carbon footprints.

13.4.2.2 Fashion Retailers Provides Effective Marketing and Promotion Campaigns

Research has shown that a closed-loop supply chain with the retailer as the leader achieves the best performance when consumers proactively participate in the return process in light of the collection efforts exerted by the supply chain members (Gao et al. 2016). Such result is illustrated by the retailer-facilitated UAC programs. As remarked by some fashion retailers under study (e.g. H&M), UAC programs arouse end consumers the possibility to reuse and recover their unwanted clothing (Tsoulfas and Pappis 2006). Being the most downstream agent in the fashion supply chain, fashion retailers can utilize different marketing channels to promote their UAC programs and help conveys the message of environmental conservation to end consumers. For instance, Patagonia held the Worn Wear Swap campaign with the sharing app Yerdle in one single day 2014. Uniqlo launched the 10 Million Way to HELP Project in 2015 to celebrate the 10th anniversary of its UAC program. These one-off campaigns can fuel the UAC programs by providing new foci and talking points, thus reminding end consumers of the UAC programs as a possible channel to clothing donation.

13.4.2.3 Partnership Between Fashion Retailers and NGOs to Make Additional Social Impact

Fundamentally, all the UAC programs under study aim at reducing waste and mitigate clothing disposal problem. Apart from this, most of them are also incorporated with elements that induce social impact. For instance, under its All-Product Recycling Initiative, Uniqlo collaborated with UNHCR to donate clothing to refugees. Eileen Fisher makes use of the proceeds from the sale of the collected apparel to charities that care about the welfare of women and girls. H&M sponsors local charitable organizations based on the weights of collected garments under its UAC scheme through the H&M Charity Star project. Such approach can also provide additional meaning to ethically conscious customers to participate in the UAC programs.

13.4.3 Implications from the Cases

With reference to the above case studies, it is deemed that retailer-facilitated UAC programs could take variable forms to fit fashion retailers of different natures and business models, such as designer brands, specialty apparel brands, and mass-market brands. In general, quality and fashionable style are two key assets of designer brand products. The used designer brand apparel items are thus most suitable for reuse and upcycling. The relatively small scale in production also allows a UAC program to be mainly managed by a designer brand alone or in collaboration of some small-scale charitable organizations. Designer brands could make reference to the approach of Eileen Fisher to collect used/unwanted clothing of own brands, and sell the collected second-hand clothing with some charitable purpose. Designer brands can also incorporate the possibility for upcycling during their product design and development process so that the used apparel could be turned into other fashionable products that reflects the designer brands' unique fashion elements. This type of UAC programs could engage loyal consumers in closer connection with the designer brands. The quality and fashion aspects of the designer brands could also be highlighted. For specialty apparel brands, like those of outerwear and intimate apparel, product functionality is emphasized in their business models. They usually have close partnership with their suppliers for product development and a considerable proportion of specialized fabrics and materials are used for the specialty apparel. The special composition of these materials could be both an obstacle and a potential for recycling. In view of this, the UAC programs of Uniqlo and Patagonia may provide some useful reference for specialty apparel brands to contribute to sustainability of their products. On the one hand, specialty apparel brands should collaborate closely with their suppliers to increase the recycling capability of the products; on the other hand, they could initiate UAC programs for their products so that the used products could be fed

back into the production process as part of the raw materials. The reverse logistics could also be more efficient by making use of the existing setup for the forward supply chain. Mass-market fashion brands are characterized by the extensive retail network and large volume of products. Their retail networks provide convenient locations for consumers to dispose their used and unwanted clothing. With the high capacity for clothing collection, it would be most efficient for mass-market brands to collaborate with independent clothing recyclers to handle recycling activities of the clothing collected whilst they could leverage their extensive retail network and marketing initiatives to enhance the collection capability of their UAC programs, similar to the case of H&M. In fact, a number of fashion brands, such as Marks & Spencer, Forever 21, Levi's, have been partnering with the third-party recycler I: CO to launch UAC programs similar to the one of H&M (I:CO, n.d.b).

Provision of monetary incentives and attachment to other charity activities are some optional measures that a fashion retailer could take into consideration when it plans to launch a UAC program. In general, green-conscious consumers are expected to be more voluntary to donate clothing in a UAC program. Monetary incentives may engage the less environmentally concerned consumers to participate in the UAC program since they could obtain tangible benefits from clothing donation. From the perspective of the fashion retailer, monetary incentives in the form of redemption coupons (e.g. like the case in H&M) may also help further boost sales. On the other hand, incorporating charity activities with a UAC program provides additional meaning to the clothing donors and their participation serves as a way to execute their social goodwill. They may have a higher level of intention to clothing donation and in turn increase the collection ability of the UAC program. For the fashion retailer, involvement in other charity activities further helps one to fulfill its corporate social responsibility. Employee participation in the UAC-related charity activities (e.g. like the case of Uniqlo's 10 Million Ways to Help Project with UNHCR) could also help strengthen employees' connection amongst one another and their sense of belonging with the company. Together with the achievement for the original purposes of the charity activities, social welfare for all concerned stakeholders could be enhanced.

The ultimate purpose of a UAC program is to fully extract and utilize all potential values from the collected clothing. To achieve this, creation of markets for recycled products and efficient recycling technology for textiles products are thus imperative (Sas et al. 2015). Some fashion companies have already started adopting initiatives for these. As observed from the above four cases, Patagonia and Uniqlo have been collaborating with their suppliers to develop fibers that can be recycled more easily and can be made of recycled apparels collected their UAC programs. H&M, on the other hand, have attempted to create more demand for recycled products by increasing the use of the recycled materials for its products. The fast fashion retailer has also been investing in and supporting closed-loop innovation (H&M Conscious Action Sustainability Report, 2015). In the long run, nevertheless, it will require the unanimous actions by all members in the fashion industry to close the loop of all fashion supply chains.

13.5   Concluding Remarks

Corporate social responsibility has been listed top in the agenda for many corporations nowadays. Being one of the largest polluters in the business sector, fashion supply chain members have been accused of bringing the largest impacts to the environment and the society. There has been an increasing demand for fashion retailers to do more to take up their responsibility as corporate citizens. As a result, many fashion companies have embedded sustainability into their business models and company visions. Recently, a number of leading fashion corporations have pledged to move towards a more circular fashion system (Global Fashion Agenda 2017). With the advance in technology, the feasibility to achieve closed-loop supply chains has become more promising. Proper handling of end-of-life apparel is critical in closing the loop of the fashion supply chain. As discussed in this study, retailer-facilitated UAC programs could make the post-consumer waste collection more effective. In particular, fashion retailers can initiate and implement UAC programs with features that fits with their respective business models to achieve the optimal collection capability.

There are several limitations of this study. Its discussion on retailer-facilitated UAC programs is based on four different cases only. Being one of the relatively recent forms of green initiatives by fashion retailers, retailer-facilitated UAC programs offer high potential and flexibility for further development. In particular, advance in textile recycling technology and consumers' increasing awareness for the need of proper clothing disposal could have influential impacts on the practices of retailer-facilitated UAC programs. Continual investigation on the evolution of the formats of the programs could be interesting and meaningful. Another drawback for this study lies on the use of secondary data. Owing to the limited information available, detailed description of the operation and execution of retailer-facilitated UAC programs are not feasible. In future, studies on the topic with primary data would be highly desirable and could generate more insights. Apart from the above, further investigation could also be undertaken to explore different possible means to strengthen the collection ability of UAC programs. For example, the use of alternative forms of incentives and partnership with charitable organizations, as well as their impacts on the effectiveness of UAC programs, offers some plausible future research directions. Literature has found empirical evidence that launching UAC programs can enhance brand awareness and attitude of the involved fashion retailers (Choi et al. 2015). In the future, the possible intangible and tangible benefits of UAC programs on fashion retailers could be explored to advocate its implementation. Profitability and the coordination issue of the closed-loop fashion chains with retailer-facilitated UAC programs can also be explored. Last but not least, the ultimate objective of the UAC programs is to extend the life cycles of apparel products. Development of recycled apparels and means to promote such market should be further explored to make closed-loop fashion supply chains more feasible.

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