

Fast fashion operations and supply chain management

How is circular economy beyond communication?

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Abstract

The fast fashion business model, known for rapid market delivery, cost efficiency, and frequent product releases, raises significant concerns about resource overconsumption, waste generation, and increased rate of garment disposal. The circular economy emerges as a vital concept to address these issues by promoting waste elimination and the regeneration and circulation of resources. This paper explores how operations and supply chain management within fast fashion firms support the adoption of circular economy practices, analysing data from sustainability reports. We discuss preliminary results and highlight the key issues for future research and or organisational disclosure.

Keywords: Circular Economy, Fast Fashion, Supply Chain

Introduction

The fast fashion industry, known for its rapid production and turnover, contributes significantly to environmental degradation. According to the Ellen MacArthur Foundation (2024a), the industry is responsible for producing millions of tonnes of clothing each year, much of which is quickly discarded, resulting in truckloads of waste ending up in landfills every second. In light of these issues, it is argued that the adoption of circular economy (CE) practices is essential for the fast fashion sector to address its unsustainable production and consumption patterns (Jia et al., 2020; Saccadic et al., 2023).

CE has garnered increasing academic interest in recent years, conceptualized by the Ellen MacArthur Foundation as a system designed to be restorative or regenerative. This approach challenges the traditional 'end-of-life' concept by promoting restoration, advocating for renewable energy, eliminating toxic chemicals that hinder reuse, and pursuing waste elimination through thoughtful design of materials, products, systems, and business models (Ellen MacArthur Foundation, 2013). The framework is structured around the R-principles which often include reduction, reuse, and recycle (Ghiselli et al., 2016). *Reduction* focuses on minimising the input of primary energy, raw materials, and waste to enhance production efficiency (Sun et al., 2013). *Reuse* is defined as the continued use of products or components for their original purpose without classifying them as waste (EU, 2018). Instead, *recycling* involves processing waste materials into new products or materials for the original or other purposes, explicitly excluding energy

recovery and the reprocessing into materials used as fuels or for backfilling operations (EU, 2018). These principles form the backbone of the CE model, emphasising a shift from linear to cyclical thinking in resource management.

Since its inception, CE practices, focusing on resource efficiency and waste reduction, have been increasingly recognized as essential for mitigating the environmental impact of the fast fashion industry. The prevalent business model in this industry promotes the rapid production of affordable, fashionable clothing, supported by a highly responsive supply chain designed to accommodate frequently changing product assortments (Turkey & Altuntas, 2014). However, this model typically overlooks environmental sustainability. Numerous studies have highlighted its adverse effects, including the production of wastewater contaminated with toxic chemicals and dyes, posing significant risks to aquatic life and human health (Brewer, 2019); the use of enormous quantities of water (Nguyen et al., 2020); the use of transport networks with high carbon dioxide emissions (Brewer, 2019); and the generation of tons of textile waste, projected to arrive to 134 million tons by 2030 (Raj & Bajpai, 2022).

In response to widespread criticism, major players in the fast fashion industry have launched several notable sustainability initiatives. For example, H&M has introduced a Garment Collecting program and a rental service, initiated in 2013 and 2019 respectively (Faithfull, 2023). Meanwhile, Zara has rolled out a Pre-owned program that integrates sustainable practices into the core of its retail operations (Reuters, 2023). However, this does not stop consumer curiosity regarding the true impact of these programs and how effectively these fast fashion giants incorporate CE principles into their existing business models. Reports still show that H&M labels are among the five most common ones present in textile waste inundating the Global South (COSH, 2023; Preuss, 2023), casting doubt on the authenticity of the sustainability disclosures and highlighting potential inconsistencies between their publicised initiatives and actual practices. Therefore, specific investigation is needed in the fashion industry, especially concerning the fast fashion sector, to reveal CE and sustainability reporting operating within more recent datasets (Uppercut et al., 2022).

To this end, this study aims to examine the role of operations and supply chain management (OSCM) in the delivery of CE practices in the context of the fast fashion sector. We strive to open the black box of what happens beyond sustainability communication towards the public and how internal mechanisms are designed and coordinated to sustain the promises. Yet, this paper is only the first step in the study. With this initial work, we aim to draw out a landscape of *what* CE practices are disclosed in the corporates' sustainability reporting, which OSCM area is involved (i.e. *where*), *how* CE practices are delivered and which actors (i.e. *who*) are involved. The insights derived from this study will be the foundation for further considerations in data collection and research questions revisions.

The rest of the paper is organised as follows: Section 2 presents the literature review with a focus on the supply chain of fast fashion firms and their communication of sustainability, section 3 presents the main methodology, section 4 the main results and finally section 5 presents conclusions and limitations, and future steps of this work.

Literature

OSCM in the fast fashion sector

The fashion supply chain begins with the creation of designs by a fashion designer, although the supply chain processes may vary, the typical supply chain process of a fast fashion company includes, first, the design and production planning phase – this step

involves developing a production plan based on customer demand, material availability, and inventory levels (Backs et al., 2021). Second, the raw materials acquisition – this step involves acquiring the necessary raw materials to make a product, which can be sourced directly from farmers or third-party suppliers (Backs et al., 2021). Third, clothes manufacturing – this step involves transforming raw materials into finished products that are ready for shipment. Fourth, is the distribution. This step involves distributing products to retail stores or customers through wholesalers or directly (Cachon & Swinney, 2011).

Incorporating principles of the CE into the fashion supply chain can be key, to minimising the nefarious impact of the industry on the environment (Turker & Altuntas, 2014). For instance, during the design and production planning phase, adopting eco-design principles ensures that garments are created with durability and recyclability in mind, drastically reducing waste. In the raw materials acquisition stage, opting for sustainable or recycled materials diminishes the reliance on virgin resources, preserving them. Manufacturing based on the use of non-toxic dyes, energy-efficient processes, and garment recovery programs can promote an increase in biodiversity. Efficient distribution methods, such as using electric vehicles and optimising logistics, can further decrease the carbon footprint.

However, the practical implementation of CE principles in the fast fashion industry presents substantial challenges. The fast fashion industry owes its special features to its requirements for shortened lead times, faster inventory turnovers and high order fulfilment rates for customers (Turker & Altuntas, 2014). The industry has a highly competitive structure that not only puts pressure on costs but also the ability to offer the newest trend to customers. Such strategies inherently conflict with the principles of the CE, which emphasises resource efficiency, waste reduction, and the extension of product life cycles. The attainment of responsiveness to demand is satisfied through the adoption of supply chain strategies like just-in-time sourcing, quick response and agile supply chain management that often lead to various ethical, employment and environmental issues (Turker & Altuntas, 2014).

Sustainability communication

The rise of the awareness of stakeholders of the inherent complexity of the fast fashion industry of the importance of addressing environmental concerns is demanding greater transparency regarding the disclosure of sustainability practices, demanding sustainability reporting. Sustainability reporting, also referred to as corporate social responsibility (CSR) reporting, is the practice of disclosing a company's environmental, social, and governance (ESG) performance to stakeholders (Buchholz & Rosenthal, 2005). Sustainability reporting encompasses communicating the company's efforts, initiatives, and impacts concerning sustainability, namely concerning CE practices. Its primary aim is to enhance transparency, accountability, and stakeholder engagement (Laplume et al., 2008).

Previous studies reported several investigations on the extent into which CE concepts are reflected in sustainability reporting. For example, drawing on 46 corporate sustainability reports in the fast-moving consumer industry (Stewart & Niero, 2018) and a worldwide dataset of sustainability reports from 1367 companies (Heras-Saizarbitoria et al., 2023) respectively, both studies have emphasised that while CE principles are increasingly integrated into corporate sustainability agendas, there is a significant gap between the theoretical frameworks and their practical implementation. The authors emphasise the need for further exploration of the systemic dimension of CE, the importance of linking CE with sustainability assessment, and the encouragement for

practitioners to clarify objectives and perform quantitative sustainability assessments. These insights are further supported by later studies, which claimed that companies are not reporting sufficient information about the CE (Dagiliene et al., 2020). Based on original empirical evidence from 226 large manufacturing companies from different industries in the European Union, Dagiliene et al. (2020) pointed out that the primary focus has always been on reducing materials and emissions, with the most expressed closed loop being “reduce”, as most companies focus on reducing materials, as well as air and water emissions. Similarly, using 138 reports published in 2020 from 94 European companies, Opferkuch et al. (2022) denoted the lack of integration of CE across all reporting elements and the need for improved targets and indicators for CE, aiming to inform future sustainability reporting guidelines and support companies in reporting their CE objectives effectively.

Even though fast fashion companies are presenting more compelling sustainability reports to the market over the years, it is not always easy to establish a benchmarking analysis between different fast fashion brands concerning CE practices, through sustainability reports (Fortanier et al., 2011). Firstly, differences in interpreting and implementing reporting guidelines lead companies to disclose different aspects (Ahi & Searcy, 2015). Secondly, varying materiality and stakeholder priorities influence focus areas and disclosures across companies (Gallego-Álvarez et al., 2018). Finally, resource constraints, especially among smaller organisations, limit the depth and quality of sustainability reporting, affecting the comprehensiveness and reliability of the information provided (Hahn & Kühnen, 2013).

In light of the upcoming international regulatory and policy updates within sustainable finance, an updated investigation is needed to determine whether companies are already voluntarily reporting CE and if so, what this reporting looks like. Also, no recent studies were found with a specific focus on the fast fashion industry, which is one of the most environmentally impactful and rapidly evolving sectors. There is a critical need for detailed research focused specifically on the fast fashion sector that assesses the current state of CE reporting, revealing the extent and depth of CE practice disclosures among fast fashion companies. Consequently, it would contribute to the development of sector-specific reporting guidelines around CE, providing qualitative and quantitative reporting frameworks that address the unique aspects of the fast fashion industry to further promote transparency and accountability in CE practice. The present study presents some initial findings on the current state of CE reporting, in the hope of setting up the foundation for future research in linking the theoretical frameworks with practical applications to bridge the gap between the conceptual understanding of CE and its practical application in fast fashion.

Research design and methodology

This research is in its early stages. Our initial exploratory phase aims to garner preliminary insights into how fast fashion companies implement and communicate Circular Economy (CE) practices. This investigation will help identify key discussion points and guide further primary data collection. Considering the data accessibility and representativeness of the case, this paper includes the analysis of sustainability disclosures primarily of public fast fashion companies. With theoretical sampling logic, the sample covers the major companies with the highest impact in terms of production and sales volume and revenue. In addition, we intentionally included one contrasting case (i.e. more sustainability-driven, much smaller in terms of volume) to facilitate comparison. We employed publicly available data sources on sustainability disclosures

which are primarily annual and sustainability reports and ESG disclosures. While only the latest reports are considered from the last two years available to the public, we have plans to look back further in history to develop an outlook on the trajectory of CE in sustainability disclosures. Details of the samples are reported in Table 1.

*Table 1 Case study samples (*contrasting case)*

Company	Headquarter	Revenue (in billion \$) [ranking]	Numbers of employees	Data input
H&M	Europe (Sweden)	22.25 [3]	155,000	Annual and sustainability report; Sustainability disclosure
Zara (Inditex)	Europe (Spain)	25.44 [2]	174,386	Annual report; Statement of non-financial information
Gap	Norther America (US)	13.8 [5]	97,000	ESG report; Global sustainability report
Everlane *	Norther America (US)	0.14	480	Impact report; Company website and news
Uniqlo (Fast retailing)	Asia (Janpan)	18.93 [4]	57,727	Annual report; Sustainability report
Shein	Asia (Singapore)	26.78 [1]	NA	Company website (Our impact; decarbonizing supply chains; Responsible sourcing etc.)

The sustainability reports are coded and analysed based on predefined themes. The data analysis considers dimensions on *what* CE practices are reported in these sustainability disclosures (e.g. reduce, reuse, recycle), which areas of OSCM are involved in the delivery of these CE practices (i.e. *where*), *how* are the CE practices delivered, and which supply chain actors are involved (i.e. *who*). We employed the abductive approach. Whenever possible, we tried to combine qualitative analysis with quantitative analysis on the target keywords. It is important to highlight our particular focus on the circular economy initiatives, strategy, and practices; while dropping out information considering general environmental impact (e.g. emissions) and social impact. The primary scope is to understand how materials and resources are circulated and regenerated within the OSCM areas and practices.

Preliminary findings

This section presents the results from a thematic analysis to provide insight into the sustainability disclosures of fast fashion companies. The findings cover the CE practices adopted, the specific areas of OSCM involved, and how these practices are delivered. Due to space restrictions, this paper presents only the result in detail of the first dimension, while the others are described in the text. We then draw some interesting discussion on these preliminary findings and illustrate how the result would continue from this stage.

Thematic analysis

CE practices. Table 2 shows the list of CE practices reported in the sustainability disclosures, together with their definitions and examples for the coded keywords. A simple statistic is shown on the frequency of the keywords and how often they are observed in the analysed documents. The technical cycle of the butterfly diagram (Ellen MacArthur Foundation, 2024b) is more often reported by the fast fashion sector than the practices in the biological cycle side, addressing practices on product lifecycle extension, product reuse and recycling, as well as the refurbishing of production facilities. In particular, practices related to *recycling* are the most common observation among all categories. Results note that using recycled content in design and production is a common strategy among the case companies. Fast Retailing, for example, has committed to responsible post-purchase product management by promoting various recycling channels

and the reuse of recycled materials. Similarly, Everlane has reinforced its dedication to upcycling and recycling by joining the California Statewide Textile Recovery Advisory Committee. Additionally, coded as *maintaining* practice, extending the product lifecycle is emphasised as a crucial action. Companies like H&M provide detailed consumer guidance on product care and repair, while Fast Retailing and Inditex offer services for repair and recycling activities, contributing to longer product usage. The *reuse* practices are mostly limited to packaging materials and the donation of used garments to those in need. However, Zara and Shien are advancing efforts to facilitate peer-to-peer exchanges of previously owned products through regional platforms, reflecting a budding trend in reuse initiatives. Despite these developments, the results highlight a notable gap in the adoption of *sharing*, *redistributing*, and *remanufacturing* practices, which are still uncommon in mainstream fast fashion. Unlike emerging brands rooted in the sharing economy or leasing models, traditional fast fashion companies have yet to integrate them into their business and to prioritise these approaches. This finding suggests a discrepancy between the fast fashion industry's sustainability rhetoric and its practical implementation, indicating areas for further critical scrutiny. Interestingly, based on the materials included in the analysis, no significant difference is observed between the comparison case (Everlane) and the other fast fashion companies. While Everlane substantially prioritise the extension product life cycle we also observed similar practices from this sustainability disclosure of the selected fast fashion company (e.g. Fast Retailing).

CE-related OSCM area. Our analysis shows that sustainability disclosures among fast fashion companies primarily focus on *purchasing* and design actions, with a significant emphasis on sourcing circular materials such as polyester, cotton, and animal fibres. These materials are often chosen for their lower environmental impact, as highlighted in Inditex's 2022 Annual Report. However, distinguishing between circular and merely sustainable practices remains challenging due to the lack of clarity in the disclosures. In the stage of *product design* and development, fast fashion giants are seeking active integration of circular economy practices. For instance, Shein's EvoluSHEIN by Design program, in partnership with Queen of Raw, utilises high-quality surplus fabric and recycled content in new collections; Everlane's 2023 Impact Report stresses the importance of selecting environmentally friendly materials during the design process. Beyond the use of circulated material in design, product development per se can also strengthen circularity. Fast Retailing (Uniqlo) underscores this approach with its LifeWear concept, which focuses on creating durable, timeliness and long-lasting products and discourages consumers from frequent replacement (Fast Retailing Annual Report, 2023). In contrast, disclosures on logistics and *production* operations are less detailed, reflecting the industry's reliance on outsourcing these activities. A few examples can be spotted from companies, like Inditex, citing the use of vertically integrated operations to enhance production efficiency and reduce waste, as stated in their 2022 Non-financial Information Report. Fast Retailing also describes efforts to establish a manufacturing framework with partners aimed at minimising waste from production onwards, as noted in their 2023 annual report. However, the consequences of these actions are not clarified, and no evidence is provided to support these statements. Finally, *post-sales services* are emerging as a new area of focus. This evolving trend represents another step towards circularity, emphasising how companies are committed to extending the lifecycle of products through customer engagement after purchase. However, garment collection for reuse and recycling are not considered in this stage as there is no concrete evidence provided considering where they eventually end up. It is interesting to note that,

based on the analysis of the annual and sustainability reports, the studied companies have not emphasised their post-consumer initiatives as much as they do in the media.

How CE practices are delivered. Our analysis indicates that *partnerships* are a prevalent strategy among fast fashion companies for implementing CE practices. These collaborations unite diverse expertise to develop solutions that promote circularity. For example, Gap collaborates with ThredUp and Give Back Box to facilitate the return of gently used clothing and shoes by customers. Similarly, H&M has partnered with Remondis to launch Looper Textile Co., which provides solutions to local municipalities and retailers for extending the life of products and reusing unwanted garments. Moreover, there are numerous initiatives involving partnerships with NGOs and charities to redirect collected garments to communities in need. Active *training* to employees (e.g. H&M), suppliers (e.g. Inditex) and local communities reinforces circular economy practices to be carried out in the correct form, communicating the corporate sustainability roadmap and goals to various actors in a supply chain (e.g. Everlane). However, the reporting on these efforts often conflates impact with broader social sustainability concerns, necessitating clearer definitions of training scopes and partnership objectives. A similar issue is spot in the use of *contracts* since it is not always specified whether the contracts are intended to secure capacity for material circulation or other purposes. Finally, the study also highlights an emerging practice of *sponsorship*, financing, and funding opportunities aimed at empowering smaller players in the supply chain. This financial support enables suppliers to invest in technologies and processes that align with the circular economy objectives of the leading firms. H&M, for instance, emphasises that funding and expertise from brands can significantly enhance suppliers' confidence to initiate trials and implement necessary changes, demonstrating the critical role of collaborative engagements in fostering circularity in the supply chain.

Discussion on the early insights

In our review of sustainability disclosures within the fast fashion industry, it is evident that many stages outlined in the butterfly diagram by the Ellen MacArthur Foundation are often overlooked. Practices related to the use of recycled materials, clearly dominate the current landscape. Yet, it was noted that this practice is located in the lower tiers of the waste management hierarchy considering the value recovered from the original products. Moreover, the specific percentages of recycled material usage are rarely disclosed with clarity – figures are often conflated with those for sustainable and responsible sourcing. Additionally, while emerging practices such as consumer engagement to extend the product lifecycle and the recycling of garments at their end of life are noteworthy, the communication about these initiatives often lacks clarity regarding their actual implementation and outcomes. Consequently, there is a pressing need for more transparent reporting schemes and guidelines on CE practices. The public deserves the right to receive clearer information on how much recycled materials are used, and how they are used (e.g. proportion within the overall material consumption; whether these materials are combined with primary sources). This call underscores the necessity for enhanced clarity in sustainability disclosures to better reflect the actual impact and effectiveness of CE practices in the sector.

Moreover, we shall not oversee the efforts from fast fashion companies to introduce new circular initiatives, such as supporting customer returns of end-of-use products, repairing, and recycling, despite many of them being implemented in restricted areas. Yet, there remains a significant gap in the disclosure of specific actions taken within their supply chains, and how their supply chains are coordinated to deliver these activities

because these are not traditional core activities of the businesses themselves. Although these companies often include CE practices in their sustainability reporting, the details on how these practices are implemented and with whom they are partnered are frequently ambiguous. From the perspective of sustainability reporting, no significant improvement is observed from when the previous studies were conducted (e.g. Aras & Crowther, 2009; Landrum & Ohsowski, 2017) that fast fashion brands often engage superficially with sustainability issues, failing to address the depth and urgency of ecological challenges adequately. Similar is the Norwegian Consumer Authority's scrutiny of H&M's Conscious Collection, which pointed out how claims of sustainability often lack substantial detail or evidence, potentially misleading consumers by creating an illusion of ecological responsibility without requiring genuine corporate action or transparency. Exchanges are attempts to project a more conscious and comprehensive approach to CE strategies.

By default, the business model of fast fashion inherently promotes high consumption rates and, as a result, frequent product disposal. Despite a shift toward using circular and recycled materials, it is crucial to explore further innovations and disruptions that could avoid waste generation from the roots. This is particularly pertinent due to the inefficiency of the reverse flows since products that are supposed to be collected and recycled still appear being disposed of (Preuss, 2023). The agility, efficiency, and on-demand production that many fast fashion companies advocate do align with CE principles. However, whether these principles are effectively integrated into their supply chains remains a significant question. This is especially true as these companies often outsource manufacturing to countries with lower labour costs, where the workforce may not have the skills required to for effective implementation.

Conclusion

This study presents preliminary findings from an investigation into how OSCM in fast fashion companies supports the fulfilment of CE claims. The research began with an analysis of publicly available data, including sustainability reports, to discern how CE practices are formalised and communicated within these organisations. This approach helps to identify the extent and efficacy of their sustainability initiatives.

The result of our study shows that, frequently, corporate sustainability reports offer incomplete narratives with vague details, leaving substantial gaps in how consumer communications are operationalized internally. This highlights the necessity for a more thorough examination of how OSCM strategies and practices are adapted to support CE initiatives. A deeper understanding is required to discern the genuine actions beyond mere lip service within these organisations. Given the interconnected nature of circularity, a broader supply chain perspective is essential to address these questions effectively, as achieving circularity extends beyond the confines of individual organisations.

As an initial stage in our research, this study faces several limitations, including the selection of cases, the materials chosen for analysis, and the absence of a longitudinal perspective. Looking ahead, we aim to conduct empirical research involving suppliers and operators within the supply chains to understand the alignment between internal communications and actions with public disclosures. Given the evolving regulations and emerging trends, the industry must take proactive steps to align with new objectives. We recognize the importance of scrutinising existing practices and gathering solid evidence. Future research could also explore organisational capabilities as a crucial factor in shaping strategic responses to upcoming legislation and rules, thereby facilitating the interface between policy-making and industry practices.

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Table 2 Overview of the coded segments - CE practices

Category	Practice	Description (ref. Ellen MacArthur foundation)	Example of quotes	Frequency	%	Documents %	
Technical cycle	Share	Increase the utilisation of products through sharing economy	/	0	0.0%	0.0%	
	Maintain	Maximise the value of a product by prolonging the usable life and increasing the intensity of product use	We offer use and care advice, information and products across our brands to prolong the life of our products. (H&M sustainability disclosure, 2023). We plan to engage our customers even more on how to care of their Everlane garments and footwear to extend product longevity. (Everlane Impact Report, 2022)	211	12.5%	57.9%	
	Reuse	Reuse the products in their original form and for their original purpose	We donate clothes collected from customers through our product reuse and recycling activities to refugees and internally displaced persons worldwide. (Inditex Annual Report, 2023) Waste generated at our corporate headquarters, logistics centers, own factories and own stores are appropriately collected and managed to be made available as a resource for repurposing through reuse of recycling. (Inditex Annual Report, 2022)	210	12.5%	52.6%	
	Redistribute	Divert products from their intended market to another customer	/	0	0.0%	0.0%	
	Refurbish	Return product to good working order repairing or replacing components	For our new DC, we used furniture from our customer service office and encouraged the use of recycled materials in the refurbishment. (H&M Sustainability Disclosure, 2023)	20	1.2%	31.6%	
	Remanufacture	Re-engineering products and components to as-new condition with the same, or improved, level of performance as a newly manufactured one	/	0	0.0%	0.0%	
	Recycle	Retain the value of the materials in a product transforming and reprocessing it into basic substances and new materials	Increased our share of recycled or sustainably sourced materials to 85%, including 25% recycled materials. (H&M Sustainability disclosure 2023) All our brands have committed to increasing their sourcing of recycled polyester to at least 45 percent of polyester used by 2025. (Gap ESG Report, 2021)	652	38.7%	57.9%	
	Biological cycle	Regeneration and farming	Regenerate natural capital to rebuild soils and increase biodiversity; Regenerate degraded ecosystems and build biodiversity and resilience on farms and surroundings	/	0	0.0%	0.0%
		Composting and anaerobic digestion	Microbial breakdown of organic matter into compost returning valuable materials to farm land	/	0	0.0%	0.0%
		Cascade	Loop the products, by-products and materials already in the economy in the biological cycle	/	0	0.0%	0.0%
Biochemical feedstock		Produce low-volume high-value chemical products using post-harvest and post-consumer biological materials as feedstock	/	0	0.0%	0.0%	