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Educational **Cases**

Do you know what happens to clothes after the point of sale?

Blockchain and Internet of Things can boost resale practices in the textile and clothes industry

When it comes to how resale business models can be implemented, two digital technologies in particular, blockchain and the Internet of Things (IoT), are pointed out as promising enablers in the literature (Alves et al., 2022).

This article presents the findings of a study that investigated how blockchain and IoT can support Circular Economy (CE) practices in the textile & clothing industry. The study highlights the prominence of leveraging resale practices as a dominant strategy that is currently evolving within the industry. The findings are based on existing research on the technologies and interviews with fashion brands, resell partners and blockchain technology providers.

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Key Insights

→ Fashion brands have various models to choose from when deciding to facilitate resale for their customers, which have implications for data collection throughout the usage phase, as well as logistics, profitability and other factors.

→ Blockchain and IoT can in general enhance transparency and authenticity in the resale market while allowing the brand to learn more about their products after the point of sale. The level of value added varies across the resale models.

→ For leveraging the potential of IoT for resale it is critical to ensure the data carrier chosen stays in the clothes throughout its whole life cycle.

→ For blockchain to support resale, the solutions provided on the market are more feasible for items of higher value.
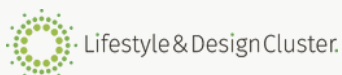
Resale a promising Circular Economy strategy

With being responsible for 10 % of global greenhouse emissions and known for often unethical working conditions along the supply chain, the textile & fashion industry is forced to take on responsibility and change (European Commission, 2022). Adapting CE practices, such as reselling, offers ways to keep selling clothes while reducing e.g. the amount of virgin materials used and waste generated (Reike et al., 2018). The adoption of CE practices is being compelled by the European Union's CE Action Plan, prompting fashion brands to adapt accordingly. While first brands are engaging in projects around circularity and thereby creating market pressure, also customers increasingly demand more sustainable products and transparent, trustworthy information.

One particular circular strategy has gained significant traction in the fashion industry, the offering of a branded resell platform. Embracing resale facilitates the extension of a garment's life cycle in its original function, thereby not needing more resources to change the product. Integrating resale into their business models enables fashion brands to take responsibility for the waste generated with their products while simultaneously reducing the consumption of virgin materials, water, and energy throughout the production process.

Resell models in practice

Resell:
More and more brands are trying to facilitate the resale of their clothes. Currently, they employ four resell models, which are as follows:

1. C2C - Branded section on a third party platform
2. C2C - Brand owned C2C platform
3a. Online resell shop - Consignment
3b. Online resell shop - Buy back

The first two C2C models enable peers to trade with each other without the brand coming into contact with the used clothes traded. Model 3a and 3b entail a take back system by the brand. This can either be a buyback, where brands re-purchase used clothes from their customers, or a traditional consignment model, where the brand takes back the clothes for a limited time, to resell them in their own resell shop on behalf of the seller. In cases where the brand implements a take-back model for garments, there's potential to incorporate supplementary circular strategies like refurbishing or recycling garments that are unsuitable for resale.
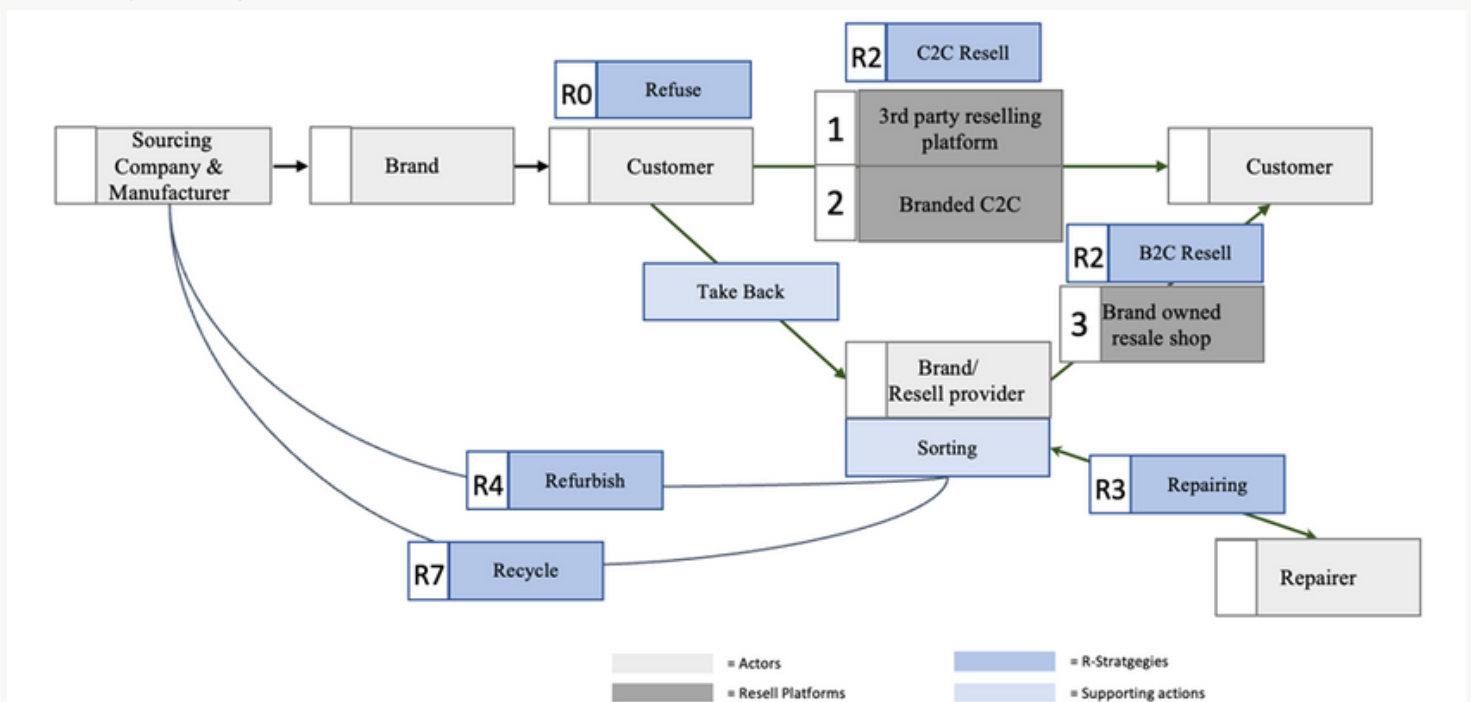

Figure 1: Resell models used by brands

Entering the resale market through each one of the four models presents a number of benefits for fashion brands. By tapping into this thriving market, brands not only offer their customer base an authentic and convenient way to extend the life cycle of their garments but also have the opportunity to increase their brand awareness and reach new customers who are interested in purchasing pre-owned, more affordable clothes. This way, brands can promote CE practices to their customers to strengthen circularity and sustainability.

By establishing a resale shop or partnering with 3rd party resale platforms, brands can showcase their measures taken towards becoming more sustainable. Embracing this strategy not only allows fashion brands to extend the lifespan of their products but also presents a unique opportunity to engage with customers beyond the point of sale, gaining valuable insights into the use cycle and quality of their garments. Moreover, when approached with a genuine commitment, offering a branded resale shop has the potential to generate additional revenue streams, which can reduce the reliance on virgin materials, water and energy required for producing new clothes.

How can IoT and Blockchain support the resell strategy?

Deepdive IoT - Internet of Things

Research shows that the resale platform can be further enhanced by using blockchain and IoT. By attaching a data carrier, e.g. QR codes or NFC tags, to clothes, an item can be linked to a webpage or a product cloud with more information about the product, its provenance, the brand and information on how to extend the lifecycle of it (Mazumdar et al., 2021).

This includes providing an easy resell option for customers, where clothes can be listed automatically on a third party platform or send back to the brand through reading the data carrier and clicking a "resell" option. As all information about the product is stored in the product cloud, the customer does not have to fill in all details and pictures manually. On the buyer side, the data carrier allows to access the same information about the product while also checking its authenticity. By attaching data carriers to clothes, buyers on the resale market can be offered an authentication feature by being linked to the original item in a product cloud.

For fashion brands IoT can collect data about which products are being resold, to what price and the like. These data points can then be used to better understand customer behaviours, market products or increase their longevity. While IoT's functionalities can be beneficial, fashion brands have to take the clothing category they are operating in into consideration. Initial research and interviews with fashion brands have shown that the suitable data carrier, its uniqueness, and optimal placement differ depending on the value and category of the clothes.

Most important is that to enhance the resell strategy the data carrier has to stay in the clothes after the point of sale. For low and medium valued clothes generic QR codes placed on care labels currently offer the best solution as brand labels are removed and unique data carriers are more costly. For luxury clothing, a unique identifier that also ensures authenticity of a specific item can be placed on the brand label as these labels are typically less frequently removed for premium products. By taking these factors into account, fashion brands can tailor their approach to align with the characteristics and needs of each clothing group.

Deepdive in Blockchain

Blockchain has the opportunity to enhance IoT by providing a transparent and immutable ledger of transactions (Agrawal et al., 2021; Alves et al., 2022; Dutta et al., 2020). Unlike traditional systems, where data is stored centrally in e.g. a product cloud, blockchain technology allows for a distributed ledger. This means that customer information is not held in a single location, minimizing the risk of data breaches or unauthorized access. Additionally, customer identities can remain anonymous, alleviating concerns about privacy and data security.

However, existing blockchains available for the resell market are limited, and the literature on this topic is still in its early stages (Alves et al., 2022), with only a small number of papers published (Hader et al., 2022, Mazumdar et al., 2021). Despite this, there are blockchain providers that offer blockchain as a service to fashion brands. These providers employ non-fungible tokens (NFTs) stored on the blockchain, where each NFT represents an individual piece of clothing. Essentially, an NFT serves as a digital representation of a tangible product in the real world. NFTs enable fashion brands to engage with customers throughout the entire lifecycle of the product. Brands can send tailored content to customers based on the specific item they own, allowing for a personalized brand experience. This grants fashion brands the opportunity to offer and control the brand experience for new customers in the resell market.

By claiming these NFTs, customers can ensure the authenticity of their purchased products as data stored on the blockchain is unchangeable. Moreover, the resell customer can be assured of the product history when post sale events such as repairs are stored on the blockchain.

Consequently, resell customers can enjoy the full brand experience and also have the assurance of guarantees. However, it is important to note that while the benefits of blockchain technology are undeniable, there are currently associated costs. Each individual product needs to be stored on the blockchain and subsequently claimed by the customer, which makes this approach primarily feasible for high-end collections.

Takeaways

→ Great potential for brands to learn more about their products after the point of sale and stay in touch with reselling customers as well as new customers that are buying used clothes. Which data do you want to collect about your clothes after the point of sale?

→ The importance of keeping data carrier attached to clothes for its whole life cycle depends on how valuable clothes are on the resale market

→ Feasibility of NFTs for resale purposes is not always given

→ Partnerships with technology providers are necessary but technologies need to be understood to communicate value

→ Commitment to strategy is critical for reducing amount of new clothes produced, which requires actively communicating strategy to customers and industry-wide collaboration to raise awareness for importance of resell

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	Functionalities	Data carrier	Placement	unique vs generic
Low value clothes	product information, product care	QR	hang tag or care label	generic
Medium priced clothes	product information, product care, resell options	QR or NFC	care label	generic or unique
Luxury clothes	product information, product care, authenticity, resell options, NFT	QR or NFC	care label, brand label	unique
Baby & Kids	product information, product care, resell options	QR	care label/hang tag	generic

Table 11: Considerations IoT for different product groups

R-Strategies	Description
Refuse: R0	""Refuse' applies to the consumers as well as the producers of clothes. In regards to the producers, this entails the refusing of hazardous materials which are commonly used in fashion and the minimisation of waste throughout the supply chain. Looking at the consumers, this implies reducing their consumption of clothes and rejecting additional waste." (p.255)
Reduce: R1	"The concept of 'reduce' encompasses the elimination of waste production rather than the disposal of waste itself. Desired consumer behaviours include using purchased products less frequently, using them with care and for longer durations for life extension." (p.255)
Resell/Re-Use: R2	"The concepts of 'resell' and 'reuse' are commonly associated with the use phase of the Product Produce and Use Life Cycle and involve the second consumer acquiring a product that requires minimal adaptations and functions similarly to the new. This can involve buying second-hand facilitated through online consumer-to-consumer platforms." (p. 255)
Repair: R3	"The concept of 'repair' aims to extend the product's lifetime and restore its original functionality. It involves actions such as fixing minor defects, replacing broken parts, and bringing the product back to working order. Businesses may also send products for repair to their own centres or third-party repair facilities." (p. 255)
Refurbish: R4	"The concept of 'refurbish' is most suitable when there is an overall improvement of a product by replacing or repairing many components while maintaining the main structure." (p. 255)
Remanufacture: R5	"Remanufacture' involves the disassembly, inspection, cleaning, and, if necessary, replacement or repair of all components in an industrial process." (p. 256)
Repurpose: R6	"The concept of 'repurpose' is commonly observed in industrial design and artistic communities, where discarded goods or components are creatively adapted for alternative functions, giving them a new life cycle" (p. 256)
Recycle Materials: R7	"The concept of 'recycling' typically involves the treatment of mixed streams of waste from consumers or producers using advanced and costly technology, such as shredding, melting, and other processes, to extract materials that are close to being pure." (p. 256)
Recover (Energy): R8	"The concept of 'recover' is used in various ways, including the collection, disassembly, and utilization of used products, the extraction of elements from end-of-life materials, and the capturing of energy from waste streams through incineration or biomass use." (p. 257)
Re-mine: R9	"The concept of 're-mining' describes the retrieval of materials from landfills, known as landfill mining or urban mining, highlighting the potential resource value of landfill sites." (p.257)

Table 1: Typology of 10 R-strategies offered by Reike et al. (2018), (pp.255)