DPP AND CIRCULARITY

Exploring New Opportunities

Onchain R&D Studio specialized in
circular data economy adoption

hello@strgl.xyz
strgl.xyz

Table of contents

03	INTRODUCTION
08	CHANGING THE SYSTEM
14	THE GROWING REUSE MARKET
19	DPPS DRIVING CHANGE
22	OPPORTUNITIES
25	CONSUMER PERSPECTIVE
35	BRAND PERSPECTIVE
45	STRATEGIC TAKEAWAYS
47	PREVIOUS RESEARCH
49	SOURCES

STRGL collaborated with fashion resale, rental, upcycling, and impact tracking companies to study the circularity benefits of adopting DPPs. This research was conducted in autumn 2024.

Executive summary

This research aimed to deepen insights into the circularity benefits of Digital Product Passports (DPPs) within the fashion industry.

Problem

The fashion system needs a fundamental change to address its sustainability challenges. While DPPs push companies to be more transparent, this transparency doesn't automatically result in increased circularity. To accelerate circularity, DPPs' circularity opportunities should be analyzed. Therefore, this study aims to explore circular opportunities for DPPs, with a specific focus on rental and resale.

Findings

We found 12 opportunities (pp. 25-44) offered by DPPs through a combination of a desktop study and interviews with company partners. The opportunities are categorized into consumer and brand perspectives (see next page).

12 opportunities enabled by DPPs

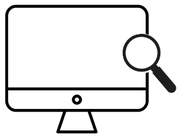
CONSUMER

- Enjoy a seamless reselling experience.
- Obtain reliable proof of the garment's authenticity.
- Be reminded to time your sales for the appropriate season.
- Understand clothing resale or rental value.
- Discover the history behind the garment.
- Read reviews to make thoughtful purchasing decisions.

BRAND

- Simplify the calculation of carbon footprint emissions.
- Build lasting relationships with current and second cycle consumers.
- Create a connected community of customers through digital benefits.
- Join a collaborative ecosystem to address major challenges.
- Achieve profitability in resale through greater efficiency.
- Support the design for longevity in product development.

The insights were gathered through three phases.



Desktop study

Reviewing various sources, such as academic articles, reports, and magazine publications.



Interviews

Representatives from seven companies were interviewed using a semi-structured approach.



Analysis

The data was analyzed using the thematic analysis method to identify key themes.

Seven partners participated in the study through interviews.

Robes Rental	RENTAL	A fashion peer-to-peer rental service that connects clothing renters and lenders.
Miela Lainaamo	RENTAL	A B2C rental service operated by the retailer Miela Designroom.
Ninyes	RESALE	A resale solution for curated, responsible fashion brands.
Kamu Outdoors	RESALE	A resale solution focused on outdoor clothing and fishing equipment.
Studio Lamea	UPCYCLING	A fashion brand using deadstock and recycled materials for capsule collections and upcycled pieces.
S Group	RETAIL	A retail cooperative including, for example, Sokos department stores.
Vaayu	DATA	A software company helping retailers track and reduce their carbon footprint and environmental impact.

CHANGING THE SYSTEM

Demand for fast-fashion in the US continues to grow

By Vivian Hendriksz

Dec 20, 2023

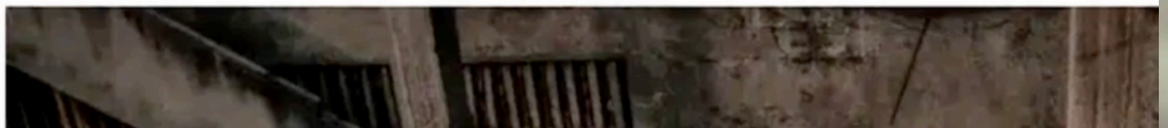


POLLUTION

Fast Fashion and Its Enviro

CRISIS - POLLUTION CRISES | BY RASHMILA MAITI | GLOBAL COMMONS

EARTH.ORG IS POWERED BY OVER 150 CONTRIBUTING WRITERS



STUDENT EDITORIAL CONTEST WINNER

How Fast Fashion Became Fast and Worse for the Earth

Vox

MONEY

Fast fashion speeding to environmental disaster

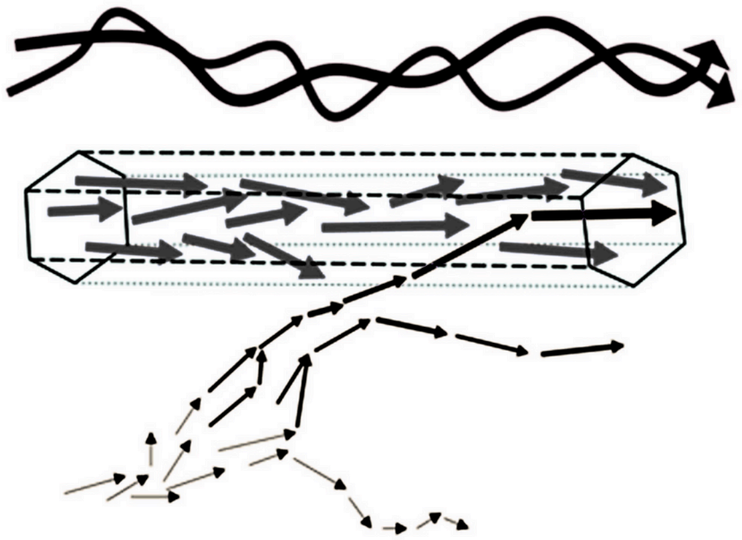
Systems change as a way to tackle today's problems.

The challenges in today's world are dynamic and complex. Therefore, to create a greater positive impact, it is crucial to understand the problems we are trying to solve as complex adaptive systems.

	Definition	Example
System	A system can be defined as "an interconnected set of elements that is coherently organized in a way that achieves something"*.	Systems are everywhere. For example, transportation system, ecosystem, solar system, political system, and education system.
Fashion system	The fashion system is a complex and global system with environmental and social sustainability challenges.	The fashion system includes multiple factors. For example, producing fibers and fabrics, designing clothes, marketing, policies to govern the industry, and consumption of clothes.
Systems change	Systems change involves deliberately altering the status quo by modifying the function or structure of a system through targeted interventions.	There are different transition pathways to create systems change. For example, new value chain models, product and manufacturing innovations, new business models.

Sources: *1 (p. 11), 2, 3, 4

The multi-level perspective aids in understanding systemic change.



The multi-level perspective illustrates how niche innovations disrupt the current system and drive change in response to pressures from the broader landscape.

Landscape dynamics

The broad societal trends and processes that influence the entire system. For example, climate action and social justice movements.

‘Regime’ level practices

The dominant way of thinking and the rules that govern the system. For example, the current fashion system.

‘Niche’ level practices

Spaces outside of the regime define alternative ways to think, govern, and shape the system. For example, innovative technologies such as our Tree® technology.

Adapted from: 4, 5

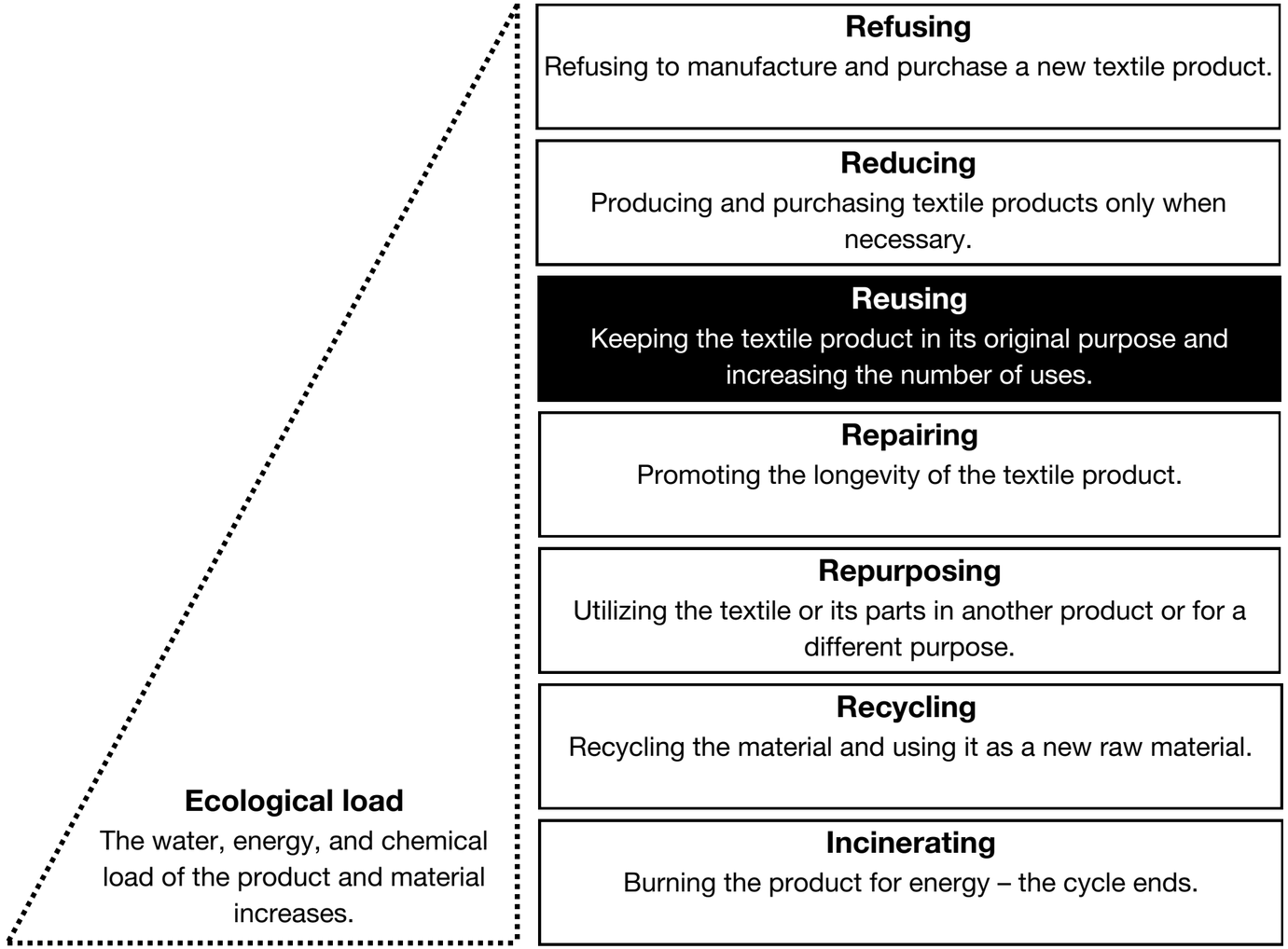
Resale and rental models change the fashion system to be circular.

The circular economy addresses global challenges, such as climate change, by separating economic activities from the use of non-renewable resources. It challenges the current linear system.

Circular economy	The circular economy is the opposite of the current linear economy. In the circular economy, materials and products circulate for as long as possible. The life cycle of materials and products is extended through various actions, such as reuse, repair, remanufacturing, and recycling.
Rental and resale as part of circularity	Renting and reselling are effective ways to extend the life cycle of clothing. Renting intensifies product use, while reselling allows the life cycle to continue with a new owner. By extending a product's life, we delay the need for replacement, reducing the demand for additional resources and lowering overall manufacturing emissions.
Circularity priority order	Different circularity strategies (such as recycling, reusing, and remanufacturing) can be ranked based on their levels of circularity, with higher circularity translating to greater environmental benefits. It is always more environmentally friendly to use clothing in its original form for as long and as much as possible. Therefore, renting and reselling rank relatively high in this priority order (see next page).

Sources: 6, 7, 8

Resale and rental models effectively reduce the ecological impact of fashion.



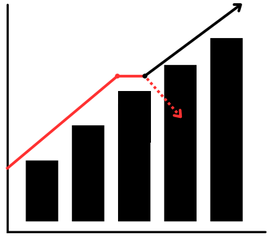
Adapted from: 8

THE GROWING REUSE MARKET

The resale market grows rapidly and offers new business value.

The resale market is huge and it keeps on growing. Consumer behavior around resale has changed and selling and using pre-owned clothes has become widely acceptable and popular.

Size of the market	The resale market has been growing significantly, currently valued at $200 billion in 2023 and projected to reach $350 billion by 2028. This growth rate is three times faster than that of the global apparel market.*
Consumer attitudes	More people are selling used products, and the social acceptance of resale goods is growing, driven by sustainability discussions. Even traditional retail brands are incorporating resale services.
Business potential	Instead of creating new products, companies could discover business potential by selling their products multiple times through resale or rental.



Sources: *9, 10, 11

However, the resale market is closely tied to the fast fashion.

The connection between resale fashion and fast or ultra-fast fashion systems challenges the environmental benefits of resale.

Financing resale services	Quality of donations	Discarding unsellable clothes	Impact on Global South	Impulse shopping
Conventional retail brands are financing their resale services by selling new products.	NFP* firms receive more poor-quality clothes because for-profit companies purchase the better quality ones.	NFP firms must discard a large amount of clothes they receive due to poor quality, making them unsellable or unexportable.	Exporting poor-quality clothes to Global South countries overwhelms local waste management systems.	The ease of circulating clothes may encourage impulse shopping of both new and pre-owned items.

*NFP = Not-for-profit

Sources: 11, 12, 13

The rental market gains popularity and has places for innovation.

The rental market is still relatively small, and the business models surrounding it are still evolving. This creates potential for innovative solutions.

Size of the market	COVID-19 severely impacted the rental market, but it has begun to grow again in recent years. However, it remains less popular than the resale market, and research on it is limited.
Consumer attitudes	Renting clothes is not yet popular among consumers. However, social acceptance and strong environmental values positively influence this trend. For some individuals who prioritize ownership, renting may seem risky and inconvenient.
Business potential	As the market has not yet reached its full potential, it offers great opportunities for innovative ideas and business models.

Sources: 14, 15, 16

Still, the rental market is relatively young and not widely researched.

Renting clothes can increase their utilization rate, thereby reducing environmental impact. However, understanding the full scope of these environmental benefits is complex.

Varying consumer behavior	Emissions from transportation	Emissions from dry-cleaning	Lack of transparency	Lack of inclusivity
The environmental impact of renting is challenging to calculate due to differing consumer behaviors.	The method of transportation used to deliver rented clothes impacts the environmental footprint of renting.	Rented clothes are often cleaned using dry-cleaning, resulting in higher GHG emissions than in regular consumer use.	B2C rental companies have faced criticism for not being transparent about how they dispose of rented garments.	Rental services typically target women and often lack broad size ranges, limiting their market engagement and inclusivity.

Sources: 16, 17

DPPS DRIVING CHANGE

DPPs push for change in the fashion system.

The digital product passport (DPP) is a digital solution that collects and displays information about the environmental impacts, raw materials, and safety of products. Read more about the DPP in the context of the textile sector **here**.

What is it?

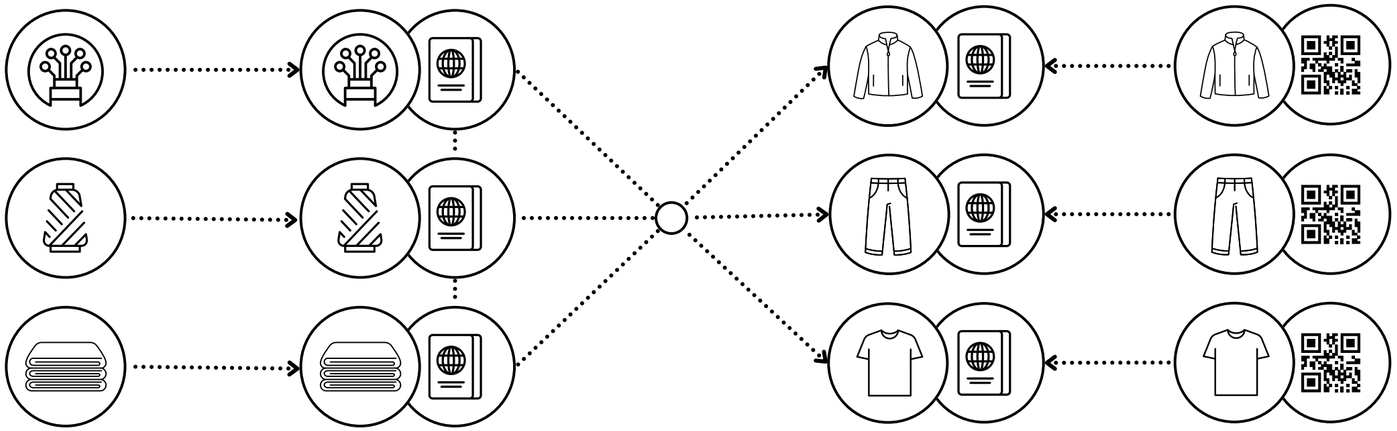
As its name suggests, the DPP is a digital representation of a physical product, collecting and displaying product information for various stakeholders across the product's value chain. The DPP will be attached to the physical item via a data carrier, most likely a QR code.

Why is it needed?

As required by the Ecodesign for Sustainable Products Regulation (ESPR) adopted in July 2024, the EU strives to enhance the traceability and transparency of value chains with the DPP. The initiative aims to promote circularity and sustainability.

Sources: 18

DPPs collect and display products' supply chain data.



01
Supply chain stakeholders

02
Supply chain DPPs

03
Garment DPPs

04
Garment/ Physical products

OPPORTUNITIES

How can DPPs support circularity in the resale and rental markets?



How to read the next slides?

These opportunities are developed in collaboration with Robes Rental, Miela, Ninyes, Kamu outdoors, S Group, Vaayu, and Studio Lamea. They are categorized into consumer and brand perspectives, respectively.

Challenge	The challenge section describes a specific issue identified in the market. These challenges were recognized through semi-structured interviews conducted with the collaborating companies.
Opportunity	The opportunity section presents a solution to the challenge, highlighting how DPPs can be used innovatively to differentiate from competitors.
Value added	The value-added section is divided into three categories: sustainability, brand, and consumer value. Each category outlines the associated benefits, although the list is not exhaustive.
Quotes and examples	The opportunities from the consumer perspective are supported by quotes gathered during a master's thesis* on the subject commissioned by STRGL (see next page). Additionally, examples from the interviewed companies illustrate the connection between this research and real-world business practices.

Sources: *19

A master’s thesis commissioned by STRGL supports the findings.

In conclusion, in the thesis it was found that DPPs have the potential to revolutionize the high-end fashion industry by facilitating circular business models. The thesis provides insights into the practical aspects of DPP implementation and service design for fashion brands in circular business for value creation.

CONSUMER

Challenges	DPP as a solution
• Fake items and insufficient product information • High effort related to listing	• Authentication and detailed product information improves trust • Lowering the barrier for listing items online • Textile lifetime extending services facilitated by DPP

BRAND

Challenges	DPP as a solution
• Possibility of higher data management costs • Views on efficiency and implementation vary based on business models and strategy	• Improved supply chain transparency • Instrumental in enabling circular economy business models

Sources: 19

OPPORTUNITIES

Consumer perpective

Enjoy a seamless listing experience.

“Too much not easily available information to input, it is a struggle to sell sometimes”

Challenge

Reselling or renting garments can be time-consuming for consumers. They must choose a platform, describe the product, locate the original product link, and handle several other tasks to create an appealing resale advertisement.

Opportunity

A direct connection between the DPP and the resale platform would allow seamless transfer of information to the resale ad. For instance, original images, precise original measurements, and product descriptions could be easily transferred.

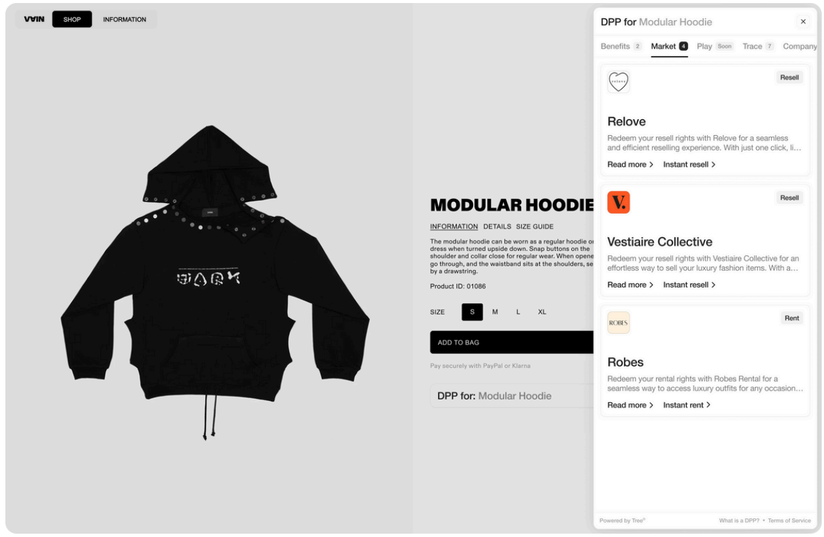
Value added

Sustainability value	Brand value	Consumer value
Increases the amount of clothes resold or rented	Gives more control over the brand image	Makes listing products easier
	Connects new consumers to the brand	Enables giving and getting accurate information

EXAMPLE

Tree® ecosystem for direct resale and rental integrations.

We have developed a Tree ecosystem that allows the DPP to integrate directly with reuse services. This enhances the consumer experience and generates new revenue streams for the clothing brand.



Obtain reliable proof of the garment's authenticity.

“A lot of options with online platforms, but they have issues with trust and not sure about the authenticity check service value as it costs money and is not 100% trustable.”

Challenge

Especially in the luxury fashion segment, reselling and purchasing pre-owned products often requires significant effort to verify authenticity. Some consumers avoid reselling or buying second-hand items because it feels too complicated and risky, with many struggling to trust individual sellers.

Opportunity

Blockchains offer the potential for tokenization, and tokenized DPPs could include proof of authenticity. This proof could be transferred to the next owner upon sale. In a blockchain-based system, no one could alter or add information without leaving a trace, making it impossible to create fake proof of authenticity.

Value added

Sustainability value	Brand value	Consumer value
Increases the resale of luxury garments	Decreases the amount of fake products	Makes reselling products easier
Reduces the level of unutilized capital	Increases the consumer trust	Makes it less risky to buy pre-owned products
	Improves brand loyalty	

EXAMPLE

Kamu Outdoors resells surplus equipment and clothing from outdoor brands.

Through collaboration with selected brands, Kamu Outdoors can provide customers with reliable product authentication by selling surplus items directly from the brands. DPPs could enable authentication for products that do not come directly from the brand.

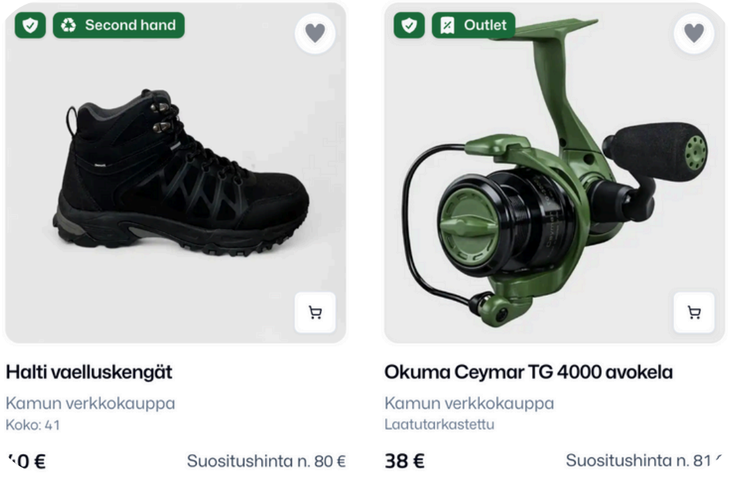


Image sources: 1

Be reminded to time your sales for the appropriate season.

“I am lazy, and usually I think about selling items in the wrong season”

Challenge

Many people have garments sitting unused in their closets, neither wearing nor reselling them. Meanwhile, during seasonal peaks, such as back-to-school periods, the resale market experiences shortages, with demand for certain products outpacing available supply.

Opportunity

Personalized messages within DPPs could remind consumers of the garments they already own, prompting them either to wear or sell the items. These reminders can be timed seasonally, based on market research.

Value added

Sustainability value	Brand value	Consumer value
Reduces the level of unutilized capital	Shows understanding of circularity	Gives monetary value of unused garments
	Boosts the amount of clothes worn in public	Simplifies tracking owned garments

Understand clothing resale or rental value.

“The main issues with listing items online are pricing, fees with stores/platforms, negotiations, postage, inputting all the information.”

Challenge

Fast fashion is so inexpensive that discarding clothes after use has become a common habit. If consumers were aware of the resale or rental value of a garment at the time of purchase, they might be more inclined to invest in higher-quality pieces that last longer.

Opportunity

DPPs could include calculations of the estimated revenue a customer can make through reselling or renting the garment. Providing these calculations to consumers before they make a purchase would help them make informed buying decisions.

Value added

Sustainability value	Brand value	Consumer value
Increases the willingness to buy more expensive high-quality clothes	Increases the consumers’ trust in quality	Makes reselling products easier
Makes resale and rental prices more transparent and fair	Gives more control over the resale and rental prices	Supports consumers' understanding of monetary value

Discover the history behind the garment.

“Ownership, repairs, and modification history are interesting pieces of data.”

Challenge

There is a growing demand for pre-owned and rental clothing. However, consumers often do not receive information about the history of the garment, even when they express interest in it. Providing this information could enhance consumer engagement and foster appreciation for the clothing's journey.

Opportunity

The creation of DPPs holds potential for storytelling. The DPP could include the garment's history, such as the original state of upcycled pieces. Additionally, renters could read about previous renters' experiences, including stories from events such as weddings or graduation ceremonies.

Value added

Sustainability value	Brand value	Consumer value
Enhances the engagement with the garment	Shows understanding of circularity	Helps to understand different concepts e.g. circularity, upcycling
Encourages brands to upcycle	Creates storytelling opportunities in an approachable way	Offers interesting stories creating attachment

EXAMPLE

Studio Lamea makes upcycled pieces in collaboration with resale marketplaces.

Studio Lamea collaborated with the resale marketplace Relove to create a collection from their unsold garments. In the future, such collaborations could leverage the storytelling opportunities provided by DPPs. Incorporating storytelling in upcycling could make the origin of the materials more relatable and engaging.



Image sources: 2

Read reviews to make thoughtful purchasing decisions.

“It is a lot of money to invest in products that I cannot be sure if they fit – no returns.”

Challenge

Hearing experiences from individuals who have used same garments is beneficial for making informed purchasing decisions, also in the resale and rental sectors. These insights can guide consumers in selecting products that better suit their needs.

Opportunity

DPPs could collect and display peer reviews on garments, making them easily accessible and approachable also in the resale and rental markets. Reading these reviews before making a purchase can help consumers make informed and thoughtful decisions, leading to more conscious consumption.

Value added

Sustainability value	Brand value	Consumer value
Decreases the amount of unnecessary purchases	Increases the consumers’ trust in the brand	Makes reselling and renting products easier
	Enhances comprehension of the features that consumers prioritize	Presents reviews on clothing fit and properties

OPPORTUNITIES

Brand perpective

Simplify the calculation of carbon footprint emissions.

Challenge

Calculating the carbon footprint of garments, especially with accurate and granular details, is complex. Consumers and regulators are increasingly demanding information on the environmental impact of products. To provide comparable data, transparency in the calculation processes is essential.

Opportunity

DPPs can track and store carbon footprint data at every stage of the product life cycle on-chain, ensuring that this information is transparent and easily verifiable. Additionally, DPPs can provide more detailed information on emission calculations, making it easier to compare the environmental impact of products.

Value added

Sustainability value	Brand value	Consumer value
Fosters transparency in emission calculations	Promotes a deep understanding of sustainability	Enables purchasing decisions to be informed by a garment’s emissions
Makes it easier to calculate emissions and define reduction goals	Reduces the effort needed for emission calculations	Facilitates understanding of garment emissions

EXAMPLE

STRGL joins forces with Vaayu to create transparent impact calculations.

In this collaboration, Vaayu's advanced impact management and traceability technology is integrated with our Tree® blockchain technology, ensuring interoperability for Digital Product Passports (DPPs). This partnership has provided valuable insights into how to transparently incorporate emission calculations into DPPs.

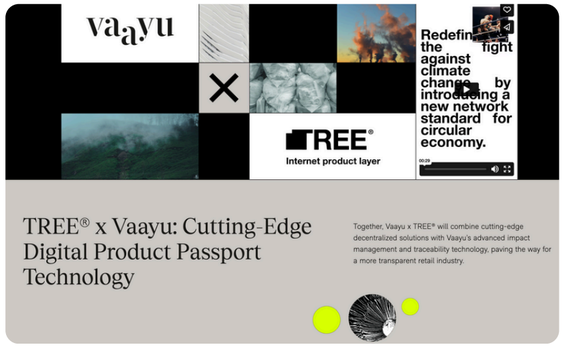




Image sources: 3

Build lasting relationships with current and second cycle consumers.

Challenge

In a linear market, the relationship with the consumer often ends after the purchase, leaving brands unable to connect with second-cycle consumers. In a circular economy, the relationship between brands and their customers should evolve to include second-cycle customers as well.

Opportunity

As mentioned, blockchains enable the creation of tokenized DPPs. Thus, consumers could receive a token for the product, which would be transferred to the next owner upon sale. This allows brands to also communicate with consumers through personalized recommendations, such as tips for extending the garment's lifespan.

Value added

Sustainability value	Brand value	Consumer value
Offers guidance for sustainable ownership of garments	Enhances consumer engagement with the brand	Gives the brand experience also as a second-cycle customer
Extends the lifespan of garments	Enables creating relationships with second cycle consumers	Provides maintenance reminders and guidance for the product

Create a connected community of customers through digital benefits.

Challenge

Building a community of brand customers is something many brands aspire to achieve. However, it is challenging because, in a linear market, the touchpoint with the customer is brief, and trends and preferences change rapidly.

Opportunity

DPPs could enable brands to offer exclusive experiences, such as secret parties, pilates classes, or concerts, tailored to their audience to strengthen brand identity. These benefits would also encourage customers to engage with the DPP and explore the product's value chain.

Value added

Sustainability value	Brand value	Consumer value
Encourages greater involvement with the garment	Supports strong brand identity	Offers new experiences with other brand enthusiasts
	Builds a community around the brand	Provides non-material benefits

Join a collaborative ecosystem to address major challenges.

Challenge

It is inefficient for a single company to handle various phases of circularity, such as repairing, reselling, and recycling. Therefore, multiple companies need to join forces. However, creating an ecosystem solely in the physical world is not scalable enough to address the magnitude of these challenges.

Opportunity

By creating an ecosystem around DPPs, companies offering various circularity services can connect seamlessly through clear contracts. Establishing this ecosystem in the digital space opens up better opportunities for scaling and multinational cooperation.

Value added

Sustainability value	Brand value	Consumer value
Improves the scalability and efficiency of circularity	Shows understanding of circularity	Decreases the barrier to repair, rent, or resell of the garment
Encourages greater involvement with the garment	Makes building partnerships easier	

EXAMPLE

S Group and Miela are pioneering physical circularity ecosystems.

S Group and Miela have both established physical ecosystems focused on circularity at their Tampere stores. These ecosystems include resale, repair, local design, rental, and recycling. Scaling such ecosystems could be further advanced by developing them in an online environment.





Image sources: 4, 5

Achieve profitability in resale through greater efficiency.

Challenge

Companies involved in sorting and reselling clothes encounter significant challenges due to the extensive manual work required in the reselling process. This manual labor is time-consuming, costly, and susceptible to errors.

Opportunity

Through DPPs, companies can efficiently obtain accurate product data. Connecting product data directly to resale platforms, further enhances the efficiency of the reselling process. Linking product data directly from its original source ensures that the information is more reliable.

Value added

Sustainability value	Brand value	Consumer value
Needs fewer resources for product listings	Establishes more effective workflows	Provides more accurate information, such as product description
Reduces the number of returns made due unclear information	Lowers the frequency of mistakes	

Support the design for longevity in product development.

Challenge

Most companies lack effective means of obtaining information on which of their products are sold in the resale market. Consequently, brands do not have reliable data on the longevity of their products and designs. Access to this data could help companies design for longevity.

Opportunity

Through DPPs, companies can obtain better information about products returning to resale platforms. This data can help companies enhance their designs for longevity, which consumers increasingly demand. Designing for durability allows companies to continue profiting from garments even after the initial sale.

Value added

Sustainability value	Brand value	Consumer value
Reduces the production of new clothes	Enables multiple revenue opportunities	Provides higher-quality garments
	Delivers data on physical and sentimental garment quality	Results in an increased resale value

EXAMPLE

Robes Rental and Ninyes can collect data on brands' top-circulating products.

Robes Rental and Ninyes both offer products from various brands, allowing them to gather data on which items circulate most frequently and the condition of those products. This information is valuable for brands, as it can be used in product development to enhance the longevity of their designs or when planning order quantities.





Image sources: 6, 7

STRATEGIC TAKEAWAYS

12 opportunities enabled by DPPs

CONSUMER

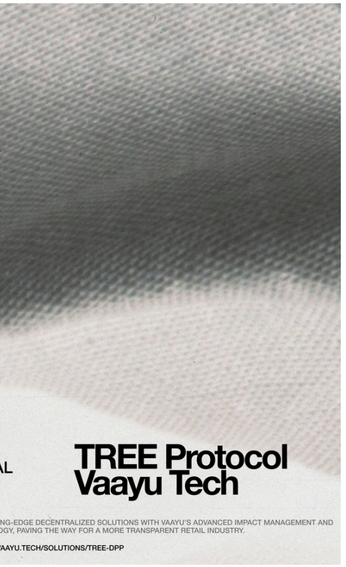
- Enjoy a seamless reselling experience.
- Obtain reliable proof of the garment's authenticity.
- Be reminded to time your sales for the appropriate season.
- Understand clothing resale or rental value.
- Discover the history behind the garment.
- Read reviews to make thoughtful purchasing decisions.

BRAND

- Simplify the calculation of carbon footprint emissions.
- Build lasting relationships with current and second cycle consumers.
- Create a connected community of customers through digital benefits.
- Join a collaborative ecosystem to address major challenges.
- Achieve profitability in resale through greater efficiency.
- Support the design for longevity in product development.

PREVIOUS RESEARCH

Dig deeper





We've conducted three main studies to understand the broader context of DPPs. Dive deeper into how STRGL is leading the way in transforming product transparency and consumer engagement.

STJM

STRGL collaborated with Reima, Image Wear, Gugguu, Sasta, and AINO to research and support their preparation for the adoption of DPPs. The consultations were organized in partnership with Finnish Textile and Fashion (STJM). This partnership with key industry players provided a unique opportunity to gather the latest insights into the evolving landscape of DPPs in the textile sector.

VERO

Partnering with the Finnish Tax Administration, STRGL explored the compatibility of organizational digital identities and digital product passports (DPPs) in a technical pilot. With the Tree® DPP infrastructure, business information was retrieved from offchain databases and fed into digital product passports published verifiably and immutably onchain.

SITRA

In collaboration with Sitra, STRGL researched the adoption of onchain digital product passports in the apparel industry. The initiative promoted transparency and traceability in line with upcoming regulations from the European Union. This research provides a technical concept for onchain digital product passports in textile value chains.

SOURCES

SOURCES

1. Meadows, D.H. (2008). Thinking in systems: A Primer. Edited by D. Wright. Sterling, USA: Earthscan.

2. Systems Innovation Network. (2018). Systems innovation course. Videos 1-3, 8-10, 13 & 16. Retrieved August 6-8, 2024 from https://www.systemsinnovation.network/posts/videos-systems-innovation-course

3. Sahimaa, O., Miller, E.M., Halme, M. et al. (2024) From Simplistic to Systemic Sustainability in the Textile and Fashion Industry. Circ.Econ.Sust. 4, 1115–1131. https://doi.org/10.1007/s43615-023-00322-w

4. Buchel, S., Hebinck, A., Lavanga, M. & Loorbach D. (2022). Disrupting the status quo: a sustainability transitions analysis of the fashion system. Sustainability: Science, Practice and Policy, 18:1, 231-246. https://doi.org/10.1080/15487733.2022.2040231

5. Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. Environmental Innovation and Societal Transitions, 1(1), 24–40. https://doi.org/10.1016/j.eist.2011.02.002

6. Ellen MacArthur Foundation. (n.d.). What is a circular economy? Retrieved August 8, 2024 from https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview

7. Systems Change Lab. (n.d.). Circular economy. Retrieved August 19, 2024 from https://systemschangelab.org/circular-economy

8. FINIX. (n.d.). Tekstiilien kiertotalouden tasot — Tuotteen ja materiaalin ekologisen ja taloudellisen arvon muutos. Retrieved August 20, 2024 from https://finix.aalto.fi/tekstiilien-kiertotalouden-tasot/

9. ThredUp. (2024). Resale report 2024. Retrieved October 2, 2024 from https://www.thredup.com/resale

10. Turunen, L.L.M. & Henninger, C.E. (2022). The Hidden Value of Second-Hand Luxury: Exploring the Levels of Second-Hand Integration as Part of a Luxury Brand's Strategy. In: Henninger, C.E., Athwal, N.K. (eds) Sustainable Luxury. Palgrave Macmillan. https://doi.org/10.1007/978-3-031-06928-4_2

11. Persson, O. & Hinton, J. B. (2023). Resale clothing markets and a just circular economy? Exploring the role of business forms and profit. Journal of Cleaner Production, 390, 1-11. https://doi.org/10.1016/j.jclepro.2023.136139

SOURCES

12. Eettisen kaupan puolesta. (2024). Resale is the new fast fashion — used clothes can increase consumption. Retrieved August 12, 2024 from https://eetti.fi/en/sisallot/second-hand-is-the-new-fast-fashion-used-clothes-can-increase-consumption/

13. Suomalainen, S. (Host). (2024). Kiihdyttääkö kätevä kirppiskulttuuri kulutusta? (No. 4) [Audio podcast episode]. In Kestävät tekstiilisysteemit. FINIX-podcast. Retrieved August 12, 2024 from https://finix.aalto.fi/kestavat-tekstiilisysteemit-podcast/

14. Rim, H. (2024). Fashion Rental Market Makes A Comeback — As Gen Z And Millennials Revive Brands Like Nuuly, Rent The Runway. Forbes. Retrieved August 13, 2024 from https://www.forbes.com/sites/hyunsoorim/2024/05/28/fashion-rental-market-makes-a-comeback-as-gen-z-and-millennials-revive-brands-like-nuuly-rent-the-runway/

15. Lee S. H. N. & Chow, P. (2020). Investigating consumer attitudes and intentions toward online fashion renting retailing. Journal of Retailing and Consumer Services, 52, 101892. https://doi.org/10.1016/j.jretconser.2019.101892

16. Biondi, A. (2024). Fashion rentals find favour but platforms struggle to thrive. Financial Times. Retrieved August 13, 2024 from https://www.ft.com/content/df4138e6-d25d-4b50-a537-908055aac476

17. Amasawa, E., Brydges, T., Henninger, C. E. & Kimita, K. (2023). Can rental platforms contribute to more sustainable fashion consumption? Evidence from a mixed-method study. Cleaner and Responsible Consumption, 8, 1-9. https://doi.org/10.1016/j.clrc.2023.100103

18. Regulation 2024/1781. Regulation (EU) 2024/1781 of the European Parliament and of the Council of 13 June 2024 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC. http://data.europa.eu/eli/reg/2024/1781/oj

19. Kuusela, M. (2024). Reimagining luxury: The potential of digital product passports in accelerating circular business models in high-end fashion. Master’s thesis. School of Business, Aalto University. Commissioned by STRGL. https://urn.fi/URN:NBN:fi:aalto-202410206786

IMAGE SOURCES

1. Kamu Outdoors. (n.d.). Kamu Outdoors webpage. Retrieved November 26, 2024 from https://www.kamuoutdoors.fi/ilmoitukset?kamuProduct=%5B%221%22%5D

2. Studio Lamea. (2024). Instagram posts. Retrieved August 28, 2024 from https://www.instagram.com/studiolamea/p/C84YmJZtqHB/?img_index=1 and https://www.instagram.com/p/C8t4EtbtCEc/?img_index=1

3. Vaayu. (n.d.). Tree® x Vaayu: Cutting-Edge Digital Product Passport Technology. Online article. Retrieved September 15, 2024 from https://www.vaayu.tech/solutions/tree-dpp

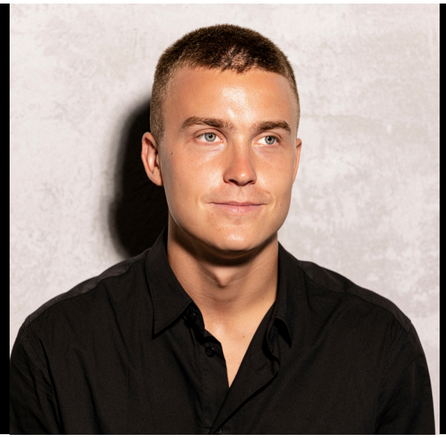
4. Sokos. (n.d.). Ansaitse rahaa kierrättämällä - Emmyn myyntilaatikot Sokos-tavaraloissa. Retrieved September 17, 2024 from https://sokospalvelut.fi/emmy/

5. Miela Preloved (n.d.). Miela Designroom webpage. Retrieved November 26, 2024 from https://www.mieladesignroom.fi/pages/preloved

6. Robes Rental. (n.d.). Robes Rental webpage. Retrieved November 26, 2024 from https://robesrental.com/

7. Ninyes. (n.d.). Ninyes webpage. Retrieved November 26, 2024 from https://ninyes.fi/en/collections

Questions, concerns? Please reach out.



Kasper Karimaa
Managing director

+358 44 2836789
kappe@strgl.xyz



Elli Jaakola
Circular Economy Specialist

+358 50 4330358
elli@strgl.xyz



Station F, 75013 Paris
Complex, 00530 Helsinki

Kasper Karimaa, Managing Director
tel. +358 44 2836789
kappe@strgl.xyz

strgl.xyz