wearagAIn

AI Transforms the Fashion Industry for Circular Commerce

Sponsored by SAP

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1. Circular Economy and the Need for Change

The fashion industry, with its considerable environmental footprint, is notorious for generating a profound amount of waste, stemming from its practices of overproduction, oversupply, and rampant overconsumption. The monetary magnitude of this sector was apparent when the global apparel market reached a valuation of $1.53 trillion in 2022 and is projected to swell to a staggering $1.94 trillion by 2027 (Global Revenue of the Apparel Market 2014-2027, 2023). Such growth comes with dire environmental repercussions; on an alarming note, every second witnesses the disposal of clothing equivalent to the contents of a garbage truck, either through incineration or landfill burial (Ellen Macarthur Foundation, 2017). This resonates with the startling reality that between 15 and 45 billion garments, accounting for up to 30% of the clothing manufactured each season, are not even sold (WGSN X OC&C Report: Doing More With Less, n.d.), thus contributing to the waste conundrum.

The detrimental influence of the fashion industry is further underscored by its position as the second-largest polluter, accountable for consuming 98 million tons of oil and emitting 1.2 billion tons of CO2 as of 2015 (Ellen Macarthur Foundation, 2017). As per a study by McKinsey & Company, the industry accounts for around 4% of global GHG emissions (McKinsey & Company & Global Fashion Agenda, 2020). Additionally, fashion firms discharge approximately half a million tons of plastic microfibers into our oceans on an annual basis—a volume equating to the plastic in over 50 billion bottles (Ellen Macarthur Foundation, 2017).

These disturbing figures can be attributed to the industry's prevailing operating model, which is predicated on speculative demand prediction, mass production, and the resultant oversupply—a linear production approach that culminates in unsold stockpile collections. Such surplus often finds its future in donation centers, incinerators, or as part of the ever-growing mounds in landfills, an epitome of the linear economy's failure to sustainably manage resources.

The fashion industry requires an urgent sustainability transition with less resource consumption, less waste emissions, and a more stable economy. In the circular economy transition, the organisational structure, logistics, and production methods of firms are reformed from the linear model of "take-make-dispose" to the circular model of "make-use-return" (Huynh, 2021).

2. SAP Recommerce: Catalyzing a Shift to a Circular Economy

The SAP Recommerce solution allows you to take back, manage, and resell pre-owned inventory. The solution helps you accelerate the shift from a linear to a circular business model, extending customer lifetime value and promoting more sustainable consumption (SAP, n.d.).

In business-to-consumer sectors such as the fashion industry with multiple stakeholders may require radical innovations in both products and processes to shift from the existing production–consumption paradigm and solve the paradox of reducing new demand while maintaining profitability (Huynh, 2021).

SAP Recommerce can help transform fashion retail operations by enabling a new reselling channel and creating a new revenue stream while simplifying the process of buying, selling, and processing of pre-owned clothing. The focus is on circularity, minimizing additional carbon footprints while maintaining profitability.

With a value estimated between $100 and $120 billion worldwide, the apparel, footwear, and accessories resale market has nearly tripled in size since 2020 and shows no signs of slowing down, and Gen Z consumers are the most likely to buy and sell secondhand (Estripeau et al., 2022).

From an economic perspective, a problem-solution fit and a product-market fit are evident.

3. WearagAIn: AI-Driven Peer-to-Peer Marketplace

WearagAIn envisions the creation of a peer-to-peer marketplace, leveraging cutting-edge SAP Recommerce technology and artificial intelligence (AI) algorithms to redefine the secondhand clothing market. The unique selling proposition of this platform is the use of AI to calculate the optimal price for pre-owned clothes, recognizing that pricing is a critical factor influencing consumers' decisions to purchase pre-owned items.

In the pursuit of creating a sustainable and user-centric marketplace, wearagAIn emphasizes the significance of optimal pricing since the price of a secondhand item can account for up to 44% of the decision-making process for potential buyers (Alam, 2014). By utilizing

AI-driven analysis, wearagAIn aims to provide intelligent pricing recommendations that consider a multitude of factors.

3.1 Core Pillars of the Solution

AI-Driven Analysis. The platform incorporates state-of-the-art machine learning algorithms to conduct a comprehensive analysis of large datasets. These datasets encompass various factors that influence pricing, including product-specific factors and market-specific factors.

Quality Control and Authentication. Transparency and trust are paramount in the second-hand market. WearagAIn implements rigorous quality control measures and authentication processes. This ensures that the items listed on the platform meet the specified standards, reducing the risk of counterfeit products and enhancing the overall user experience.

Measurable Sustainability Impact. WearagAIn integrates a dedicated sustainability dashboard, allowing users to track and understand the positive environmental impact of their secondhand purchases. Metrics such as estimated water saved, reduced carbon footprint, and diverted waste from landfills provide users with tangible evidence of their contribution to a more sustainable fashion ecosystem.

4. Factors Influencing Optimal Pricing

Understanding the myriad factors that contribute to optimal pricing is fundamental to wearagAIn's mission. Through a comprehensive survey involving over 30 participants (Appendix A) and insights derived from research conducted by Alam, 2014 and Han et al., 2021, wearagAIn has identified key determinants that influence the pricing of pre-owned clothing. These factors can be broadly categorized into two groups: product-specific and market-specific considerations.

4.1 Product-Specific Factors

Condition. The current state of the item, whether it's new with tags, gently used, or well-worn, significantly impacts its perceived value.

Brand Reputation. The reputation of the brand associated with the item plays a crucial role. Established and reputable brands often command higher prices.

Rarity or Limited Edition. Items that are rare or part of a limited edition collection tend to have higher perceived value due to their exclusivity.

Age and Resale Cycle. The age of the item and where it stands in its resale cycle influence pricing. Vintage items and those in high demand may command higher prices.

Geography. Local factors, including regional demand and trends, can influence the pricing of secondhand items.

Seasonality. Clothing preferences vary with the seasons, impacting the demand and pricing of certain items during specific times of the year.

4.2 Market-Specific Factors

Market Trends. Staying attuned to current fashion trends and market demands is essential. Items aligned with prevailing trends may have higher resale values.

Consumer Behavior and Preferences. Understanding what consumers are currently seeking and their preferences shapes pricing decisions.

Demand or Popularity of the Product. Items that are currently in high demand or are popular among consumers may command higher prices.

Availability in the Market. The scarcity or abundance of similar items in the market can influence the perceived value of a product.

Current Market Pricing or Competitor Prices. Awareness of the pricing landscape within the market and what competitors are charging for similar items is crucial for setting competitive and reasonable prices.

Historical Sales Data. Analyzing past sales data helps in understanding how similar items have been priced and sold in the past, providing insights into market dynamics.

5. Datasets and AI Strategy

The heart of wearagAIn's innovative approach lies in harnessing artificial intelligence (AI) to optimize pricing for pre-owned clothing. This process involves a meticulous strategy for data collection, preprocessing, and AI model training.

5.1 Types of Data

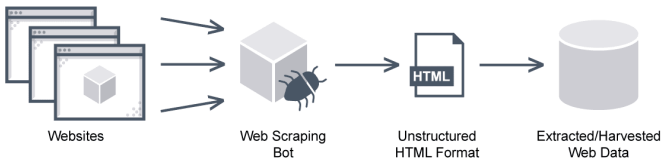
Multifaceted Dataset. WearagAIn utilizes a combination of visual, textual, and historical information to determine the price of second-hand items.

- Images: capturing visual elements and attributes.
- Product-Specific Factors: condition, brand, rarity, age, geography, and seasonality.
- Market-Specific Factors: trends, consumer behavior, demand, availability, pricing data, and historical sales records.
- Price: the actual or initial price.

5.2 Sources for Datasets

Commercial Data Providers. WearagAIn taps into reputable commercial data providers such as AWS Data Exchange and Google Cloud Marketplace to access curated datasets tailored for fashion and apparel analysis. Example datasets include the Ecommerce Apparel and Clothing Data Set by Shutterstock and Pricing Optimization by ElectrifAi.

Web Scraping. Responsible web scraping is employed to gather real-time data from popular second-hand platforms. Similar platforms such as Poshmark, Depop, and Vinted are scraped, always ensuring compliance with ethical standards and respecting user privacy.



Checking each website's "robots.txt" to know which pages should not be scraped, always being mindful of user privacy:

Poshmark: easy to scrape, no legal terms

Depop: okay to scrape, no legal terms

Vinted: okay to scrape, no legal terms

(source: www.scrapingscore.com)

5.3 AI Model Training

Preprocessing. Data preprocessing is conducted to clean and prepare the data for

analysis. Image and text features are extracted for comprehensive insights.

Neural Network Training. As per a study by Goti et al., 2023, most commonly used AI technology in the e-commerce world of fashion can be divided into three major categories: computer vision (CV), natural language processing (NLP), and other machine learning (ML) applications. The reasoning behind this division is that, when dealing with garment data, most authors process the images of the garments, their text description, or other data, with the first two being the more prevalent ones.

Therefore, various approaches are combined in a multimodal system to predict the pricing aspect of each item. This involves training the model with both image and textual data.

- **Trend Factor Integration.** Social media has become a larger and more common source of information in recent years. Social media platforms provide insight into how consumers feel about things, making it possible to forecast future sales or alter products to better meet customer needs (Goti et al., 2023).

  To enhance precision, wearagAIn couples the pricing predictions with trend data. Partnerships with trend analysis experts such as Heuritech and Stylumia provide access to computer vision and AI-powered demand sensing algorithms, allowing wearagAIn to adapt to evolving consumer preferences.

6. Bridging Profitability and Sustainability

The collaboration between SAP Recommerce, wearagAIn, and AI represents a transformative approach to circular commerce in the fashion industry. By aligning profitability with sustainability, the project addresses the environmental challenges posed by the linear fashion model. Accurate pricing becomes the catalyst for change, influencing consumer choices and contributing to waste reduction. The combined efforts of these entities reshape the fashion industry towards a circular and sustainable future where technology and innovation lead to responsible and conscious consumer behavior. The circular economy vision is not only feasible but also profitable, creating a positive impact on both businesses and the planet.

7. References

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8. Appendix

A: Result of survey (The importance of factors when deciding to buy a pre-owned item) conducted by the team

Priority List	Rank1	Rank2	Rank3	Rank4	Rank5	Rank6	Rank7	Rank8	Rank9	Rank10
Product Type	8	4	6	5	2	6	2	0	1	0
Brand & its Reputation	5	6	3	10	6	2	0	2	0	0
Product Condition	13	13	6	1	0	1	0	0	0	0
Current Market Pricing or Competitiors Prices	2	2	5	9	4	6	5	1	0	0
Product's Rarity or Limited Edition	0	1	5	1	4	5	6	6	6	0
Popularity/Demand in the Market	0	1	0	0	3	3	11	7	7	2
Current Market Trend	2	2	2	1	2	2	3	11	9	0
Product Image	3	3	1	4	9	2	1	4	5	2
Other (please specify)	0	0	0	0	0	0	0	0	0	24
Product age and re-sale cycle	1	2	6	1	2	3	4	2	3	0