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"DRIVING THE NEXT LEVEL OF PERSONALIZATION THROUGH AI-POWERED FEEDBACK TOOL AND CONSUMER INSIGHTS IN BEAUTY-TECH"

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1. Introduction

The cosmetics market is becoming increasingly fragmented, with products narrowly targeting singular concerns such as anti-frizz, shine, or curl definition. While this segmentation provides specialized solutions, it often fails to address the complexity and diversity of individual consumer needs. A consumer-centric survey conducted in 2023 by Prose in the United States with 904 respondents revealed that 80% of respondents selected six or more hair concerns from a list of industry-standard targets, including anti-frizz, bond repair, scalp relief, and heat protection. This underscores the fact that consumers typically face a multitude of concerns simultaneously, rather than isolated issues.

This complexity creates a challenge: consumers must either compromise on their priorities or purchase and layer multiple products from different ranges, often leading to overly complex, costly, and inefficient routines. The growing demand for personalization reflects a desire for solutions tailored to individual lifestyles, goals, and values.

A promising approach to address this challenge is through a technology-driven personalization model.

The process begins with a comprehensive online consultation, collecting data on over 85 parameters such as hair and skin type, treatment history, environmental exposure, and personal preferences (e.g., fragrance choices, ingredient exclusions). Using this input, AI-powered algorithms generate customized formulations from a curated portfolio of ingredients. Each product is made-to-order in a dedicated facility and shipped directly to the consumer (figure 1).

Personalization does not end with product delivery. A proprietary feedback tool enables users to provide detailed evaluation feedback after product use. This post-use feedback loop, powered by patented AI technology, supports dynamic formula iteration, allowing to further optimization of the product based on both evolving needs and user-perceived performance and satisfaction.

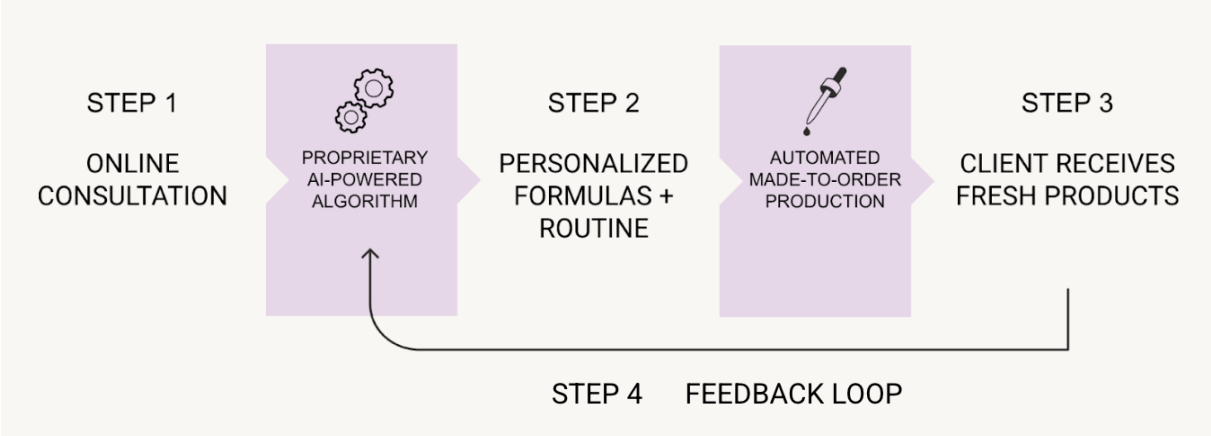

Figure 1. Schematic representation of our proprietary technology driven personalzed model based on an AI-powered feedback tool for personalization of the customer experience

This proprietary feedback loop introduces a unique and unparalleled layer of personalization to the customer experience.. A step-by-step overview of the process is presented below.

After each order, consumers are invited to complete a product-specific survey (covering haircare, skincare, or supplements) made of 15+ structured and open-ended questions. These questions are organized into five key categories:

- Overall Experience and Satisfaction – Users rate their general experience and the condition of their skin, hair and scalp on a 5-point scale.

- Targeted Concerns & Improvement Tracking – Consumers assess and report perceived improvements on specific concerns (e.g., dryness, frizz, volume, sensitivity for haircare products), with contextual options like “some improvement, but could be better” or “it wasn’t a concern.”

- Individual Product Feedback – Each product (e.g., shampoo, conditioner, mask, oil) is evaluated for its efficacy, sensorial qualities, and performance.

- Fragrance & Texture Preferences – Users rate their satisfaction related to product’s texture and scent. They may opt to switch to another fragrance or texture for the next order.

- Open-Ended Feedback – Free-text responses allow for the collection of richer, deeper, and more qualitative insights into the consumer experience

This rich dataset enables precise, iterative formula optimization of formulations tailored to each individual while simultaneously informing broader algorithmic updates.

Since the tool’s implementation in 2019, over 1.6 million post-use product feedbacks have been collected. A patented AI-powered algorithm analyzes each response to identify potential optimizations and generates updated formulations for subsequent orders. These refinements can range from subtle adjustments (e.g., modifying fragrance intensity or

adjusting active ingredient concentrations) to more substantial changes (e.g., switching base textures or introducing new active ingredients).

The objective of this study was to evaluate the impact of this AI-powered feedback tool on the consumer experience and satisfaction.

2. Materials and Methods

Study Design

To assess the impact of the AI-powered feedback tool, the study focused on a cohort of 493407 consumers who completed the feedback survey at least twice, after their first and second order, between March 2019 and December 2024. This longitudinal approach allowed the comparison of responses over time to evaluate the tool's influence on key performance indicators.

Evaluation Metrics

The analysis was based on the following metrics:

- **Overall consumer satisfaction**:
  Measured using the Top2Box score, representing the percentage of respondents selecting ether 4 or 5 on a 5-point satisfaction scale.
- **Individual product satisfaction:**
  Assessed via Top2Box scoring for each personalized formula to capture product specific satisfaction.
- **Perceived improvements in targeted concerns**:
  Derived from consumer-reported outcomes addressing issues such as dryness, frizz, volume, and scalp sensitivity. Responses included contextual gradations such as "yes," "some, but could be better," "no," and "it wasn't a concern."
- **Adjustments in fragrance or texture**:
  Tracked to evaluate the uptake and appreciation of the system's agility in accommodating sensory preferences.
- **Reordering rate**:
  Defined as the proportion of consumers who placed at least one subsequent order within a defined timeframe following the use of the feedback tool on their first order.

Data Analysis

This multi-metric approach provided a comprehensive view of the feedback loop's efficacy in enhancing personalization, performance, and consumer engagement.

In addition to individual-level optimizations, aggregated feedback data was analyzed by a dedicated data science team to detect systemic improvement opportunities.

3. Results

The impact of the AI-powered feedback tool was evaluated in a cohort of 493407 consumers who completed the feedback process at least twice, after their first and second order. The results revealed significant improvements across multiple dimensions:

- **75%** of consumers reported improved satisfaction after engaging with the feedback system.

- **57%** of customers who initially reported no noticeable antibrassiness effect from their conditioner (“No” response at order #1) later observed an improvement (reporting “Some” or “Yes” in antibrassiness performance by their second order).

- **43%** of customers who initially reported their conditioner left their hair either dry and under-conditioned or over-conditioned and heavy (at order #1) later indicated that their hair felt “soft and manageable” after using the adjusted conditioner (at order #2).

- **77%** of consumers who engaged with the feedback tool after their first order placed at least one subsequent order, compared to a 57% reordering rate among those who did not engage with the tool. This 20-point increase underscores the strong positive impact of the feedback system on customer retention.

The system’s agility supports rapid, individualized formula optimization—such as adjusting textures to align with changing seasons and consumer preferences—ensuring that updates are implemented ahead of the customer’s next monthly shipment:

Key behavioral insights include:

- **55%** of haircare users choose to change the fragrance of their product, after engaging with the feedback tool.

    - This trend is partly linked to satisfaction levels with the initial fragrance: 89% of respondents who were dissatisfied (rating 1 or 2 out of 5) with their first-order fragrance selected a different scent for their next order.

    - Interestingly, even among satisfied users, 47% of respondents who rated their first fragrance 4 or 5 out of 5 still chose a different scent next time—reflecting a clear desire to explore and experiment with new fragrances.

- **28%** of skincare users opted to change their product’s fragrance, after engaging with the feedback tool, highlighting the system’s flexibility to accommodate sensory customization.

- **37%** of skin moisturizer users requested a texture change (e.g., from a rich cream to a lightweight gel), underscoring the relevance of real-time product adjustments in response to user feedback.

These findings highlight the effectiveness of consumer-driven feedback loops in optimizing personalization, enhancing product performance and improving the overall user experience in real time.

4. Discussion

The results of this study demonstrate the added value of integrating AI-driven feedback systems into personalized cosmetic product development. By enabling real-time, consumer-informed adjustments, this approach challenges the limitations of conventional R&D cycles,
Indeed, this study highlights the transformative potential of AI-powered feedback systems in the realm of personalized cosmetics. Unlike traditional product development models that rely on retrospective consumer studies and multi-year iteration cycles, the proprietary feedback loop implemented here enables real-time product adjustments and refinement based directly on consumer experiences. This represents a meaningful advancement in the beauty-tech landscape, aligning with the expectations of today's consumers for immediacy, relevance, and adaptability. Moreover, the continuous loop of feedback and refinement represents a paradigm shift—from reactive product iteration to proactive, data-guided personalization.
This system also redefines the consumer role, transforming users into active contributors in the formulation process. Importantly, this feedback mechanism promotes a sense of user empowerment.. Consumers are no longer passive recipients but active co-creators in shaping their personalized formulations. This participatory model not only strengthens the personalization experience but also fosters deeper engagement, a sense of ownership, and trust, which are key drivers reinforcing long-term brand engagement and loyalty in the personalized care space while also simultaneously enhancing product performance over time.
Beyond individual personalization, the system also generates aggregated insights with broader applications, offering opportunities to refine and optimize the formulation algorithms for all. For example, the case of bleach-treated hair, for instance, illustrates how user-generated data can guide targeted formulation improvements for specific subpopulations—a level of responsiveness rarely achieved through standard testing protocols. Indeed, the recurring reports of insufficient conditioning among consumers with full-head chemical bleach treatments triggered a targeted algorithmic refinement, enhancing product performance for this specific subgroup. Such responsiveness achieved through dynamic data analysis is typically unattainable through traditional R&D methods.

Furthermore, the ability to dynamically update product characteristics such as fragrance, texture, or active concentration provides a flexible and responsive framework, aligned with consumer expectations for seasonal adaptation, evolving needs, and sensory satisfaction.
Taken together, this model illustrates the potential for AI-enhanced systems to transform cosmetic formulation from a static offering into a living process, adaptive, responsive, and continuously optimized.

5. Conclusion

This study highlights the transformative role of AI-powered feedback systems in redefining personalization within the cosmetic industry. The integration of AI-powered feedback tools into personalized cosmetic formulation represents a paradigm shift within the beauty-tech landscape. Unlike traditional product development cycles, which rely on long-term trend analyses and delayed consumer insights, this dynamic feedback loop enables near-instantaneous adaptation to individual experiences. By leveraging post-use perceptions and preferences at scale, it delivers deeper personalization, enhances consumer satisfaction, and drives continuous innovation—one consumer at a time.

By enabling real-time, consumer-informed adjustments, this approach bridges the gap between evolving individual needs and product performance, fostering deeper satisfaction and loyalty. Consumers become active participants in their beauty journey and they benefit from products that not only meet their evolving needs and preferences, but also reflect their active participation in the co-creation process.

Simultaneously, the aggregated feedback enables larger algorithm improvements, facilitating large-scale optimizations across the broader consumer base. Indeed, beyond individual customization, the collective analysis of feedback data unlocks new pathways for systematic optimization, continuous innovation, and scalable product improvement.

Together, these advancements demonstrate that feedback-driven personalization is both technically feasible and strategically valuable and transformative. It establishes a new standard for consumer centric beauty innovation, positioning AI-enhanced systems as a key driver of the future of beauty tech. As beauty-tech continues to evolve, feedback-driven personalization is poised to become a cornerstone of future cosmetic development.