Optimizing E-commerce Profitability: A Data-Driven Analysis of Returns and Customer Behavior at a Leading Fashion Retailer

Status Completed

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The Challenge

The analysis uncovered a critical challenge: a **36% return rate**, resulting in **€179,691 in lost net sales**. This alarmingly high figure pointed to serious profitability concerns, particularly in categories like shoes (51%) and lingerie (48%), and among first-time buyers (40%).

Approach

- Used **SQL** for segmentation by product, customer type, and channel.
- Conducted **Chi-squared tests** to validate statistically significant relationships.
- Built **Random Forest and Logistic Regression models** to predict return risk (Random Forest: 76.8% accuracy, AUC 0.78).
- Conducted **CLV and cohort analysis** using SQL window functions.
- Utilized Tableau for dashboard creation and visual insights.

Key Insights

- **Fit-related issues** ("Wrong size" and "Fit not right") caused 33% of returns.
- **Size guide usage** significantly reduced return rates.
- First-time buyers and TikTok-acquired customers showed the highest return tendencies.
- Premium members had the lowest return rates and highest CLV.

Business Impact

- Proposed interventions (e.g., sizing tools, better descriptions, marketing optimization) could cut returns by 5–10%.
- Scenario modeling showed €25K–€50K net sales recovery per period.
- Estimated ROI between 10% to 15% from proposed strategies.

Skills

Excel • SQL • Python (pandas, scikit-learn) • Tableau • EDA • Predictive Modelling • CLV Analysis • Business Insight Communication

Link to Tableau Dashboard: Ecommerce Returns Analysis

Link to code bases and files: Ecommerce Analysis