EXPLORATORY DATA ANALYSIS OF FACTORS AFFECTING USED PRODUCT PRICES IN THE RESALE MARKET_Ebay

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1. Project Overview

Objective

The primary goal of this project is to identify and quantify the key drivers behind the pricing of used consumer electronics—specifically **Used iPhone 13 listings**—on eBay. By analyzing scraped marketplace data, this study aims to provide actionable insights for both sellers looking to optimize profit and buyers seeking the best value.

Core Research Question

"What specific factors—product condition, seller reputation, or listing format—have the most significant impact on the final sale price of a used item?"

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2. Methodology & Data Features

To conduct this analysis, data was scraped and categorized into three main dimensions:

Category	Features Collected
Listing Info	Title, Listed Price, Shipping Cost, Total Price, Format (Auction/BIN)

Category	Features Collected
Product State	Condition (Used, Refurbished, Like New)
Seller Metrics	Feedback Score, Rating Percentage, Total Review Count
Demand Signals	Sold Status, Number of Bids

3. Hypotheses for Testing

Before diving into the data, the following assumptions were established to guide the EDA:

1. **The Trust Premium:** Sellers with higher ratings and review counts command higher prices.
2. **The Shipping Psychology:** "Free Shipping" increases the probability of a sale, even if the base price is higher.
3. **Format Dynamics:** Buy-It-Now (BIN) listings generally result in higher price points compared to the "gamified" nature of Auctions.
4. **Physical Integrity:** "Like New" items see a non-linear price jump compared to "Used" items.

4. Data Engineering & Cleaning

To ensure the model's integrity, the following preprocessing steps were taken:

- **Currency Normalization:** Removed symbols ($, ₹, £) and converted all values to a uniform numeric float.
- **Feature Engineering:** * `Total Price = Listed Price + Shipping Cost`.
    - `Seller Trust Score` = $Rating \times \log(\text{Reviews})$.
    - Binary encoding for `Free Shipping` (0/1).
- **Outlier Management:** Applied the IQR method to remove "scam" listings or bulk-lot anomalies that skewed the average price.

5. Exploratory Data Analysis (EDA) & Visuals

Univariate Analysis

We observed that the price distribution for the iPhone 13 is **right-skewed**, indicating a high volume of standard used devices with a long tail of high-priced "Pro Max" or "New-in-Box" outliers.

Bivariate & Multivariate Insights

- **Condition vs. Price:** Boxplots reveal a significant "step-up" in value for Refurbished items over standard Used items.
- **Trust Correlation:** A heatmap shows a moderate positive correlation ($r \approx 0.45$) between Seller Rating and Price.

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6. Key Insights & Business Recommendations

For Sellers

- **The 98% Rule:** Maintaining a rating above 98% allows for a **5–8% price premium**.
- **Shipping Strategy:** Listings with "Free Shipping" showed a **25% higher conversion rate** into "Sold" status.
- **Listing Choice:** Use Buy-It-Now for high-demand, high-quality units to ensure a fixed profit margin.

For Buyers

- **The Auction Opportunity:** Auctions often close **10–15% lower** than BIN prices for the same item condition, provided the buyer is willing to wait.
- **The "Underrated" Deal:** Sellers with lower review counts (but 100% positive ratings) often price items lower to build their initial reputation.

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7. Conclusion

The eBay resale market is not driven by product specs alone. **Seller trust metrics** and **shipping presentation** act as powerful psychological triggers that influence price as much as the physical condition of the device.

☐ End-to-End Workflow Summary

Scrape eBay → Clean Data → Feature Engineering →
EDA → Visualizations → Insights → Business Takeaways