Flipkart Sales Analytics Project Report

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1. Business Problem

Flipkart is one of India’s largest e-commerce platforms, hosting a vast catalog of products across multiple categories, brands, sellers, and price segments. With thousands of products listed simultaneously, business teams face challenges in understanding overall product performance, customer behavior, and operational risks in a consolidated manner.

Key business decisions such as pricing strategy, discount optimization, payment mode planning, and return risk management require data-backed insights. Without structured analysis, it becomes difficult to identify which product segments drive value, where excessive discounts are being applied, or which areas pose higher return risks.

The primary objective of this project is to perform an end-to-end analysis of Flipkart sales data to answer critical business questions, including: - How are products distributed across different price segments? - What discount patterns exist across pricing bands? - How do customers perceive product quality through ratings? - Which payment modes contribute the most to overall revenue? - Are there specific segments with higher return risk?

This project aims to support data-driven decision-making by transforming raw sales data into actionable insights and presenting them through an interactive visualization layer.

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2. Data Cleaning and Feature Engineering Using Python

Python was used as the primary tool for data cleaning and preparation due to its flexibility and strong ecosystem of data analysis libraries. Libraries such as Pandas and NumPy enabled efficient handling of large datasets and complex transformations.

2.1 Data Cleaning Steps

The raw dataset was first inspected to understand its structure, data types, and quality. Several preprocessing steps were applied:

- The `listing_date` column was converted from object data type to datetime format, enabling accurate time-based analysis.
- Missing values were identified across columns. In attributes such as `size`, null values were handled by assigning logical placeholders to maintain consistency.
- Numerical fields such as price, discount percentage, and ratings were validated to ensure they contained realistic and usable values.
- Duplicate checks were performed to confirm that each product record was unique.

2.2 Feature Engineering

To enhance analytical depth, new derived features were created:

- **discount_amount**: Calculated as the difference between original price and final selling price.
- **price_band**: Products were categorized into Low, Medium, High, and Premium price segments.
- **rating_band**: Ratings were grouped into qualitative categories such as Poor, Average, and Good.
- **return_risk_flag**: Products were classified based on their likelihood of return using business-defined logic.
- **listing_year, listing_month, listing_month_name**: Extracted from the listing date to support trend analysis.

After cleaning and feature engineering, the dataset was validated and prepared for downstream analysis in MySQL and visualization in Power BI.

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3. Data Analysis Using MySQL

Once the dataset was cleaned and transformed, it was loaded into a MySQL database for structured analysis. Using SQL allowed efficient aggregation, filtering, and segmentation of data to answer business-focused questions.

3.1 Database Design

A structured table was created with appropriate data types for numeric, categorical, and date fields. This ensured accurate querying and optimal performance during analysis.

3.2 Key Analyses Performed

Several analytical queries were executed, including:

- Product distribution across price bands to understand market focus.
- Analysis of average selling price and discount behavior by price segment.
- Monthly trends in product listings to identify seasonality or growth patterns.
- Revenue contribution analysis using final selling price.
- Identification of high return-risk products and their concentration across segments.
- Payment mode analysis to understand transaction behavior and revenue dependency.

MySQL enabled a structured and repeatable analysis layer, ensuring that insights were derived using reliable and scalable queries.

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4. Data Visualization Using Power BI

Power BI was used to create an interactive dashboard that connects directly to the MySQL database. The dashboard was designed with a business-first approach, enabling stakeholders to quickly understand key metrics while also allowing deeper exploration through filters.

4.1 Dashboard Components

The dashboard includes the following key visual elements:

- **KPI Cards**: Display overall metrics such as total products, average selling price, average discount amount, average rating, and high return-risk product count.
- **Line Chart**: Shows monthly trends in product listings, highlighting growth or seasonal patterns.
- **Bar Chart**: Displays product distribution across categories or price bands.
- **Column Chart**: Analyzes average discount percentage by price band.
- **Donut Chart**: Represents product rating distribution across rating bands.
- **Treemap**: Illustrates revenue contribution by payment mode and price band.
- **Slicers**: Enable dynamic filtering by brand, listing year, and other relevant dimensions.

The interactive nature of the dashboard allows users to explore insights tailored to their specific business questions.

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5. Key Insights and Findings

The analysis and visualization revealed several important insights:

- The Medium price band contains the highest concentration of products, indicating strong seller participation in this segment.
- Lower-priced products tend to receive higher discounts, suggesting aggressive pricing strategies to drive sales volume.
- Most products maintain Average to Good ratings, reflecting generally acceptable product quality across the platform.
- Revenue contribution is well distributed across major payment modes such as UPI, Cards, and Cash on Delivery, reducing reliance on any single payment channel.
- High return-risk products are concentrated in specific segments, highlighting opportunities for improving product quality, descriptions, or logistics processes.

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6. Conclusion

This project demonstrates a complete end-to-end data analytics workflow, starting from business problem definition and raw data cleaning to SQL-based analysis and interactive visualization. By combining Python, MySQL, and Power BI, the project delivers meaningful insights that can support pricing optimization, payment strategy planning, and return risk management.

The structured approach followed in this project closely mirrors real-world analytics workflows, making it a strong portfolio piece that showcases practical data analytics skills.