



Amazon Sales & Fulfillment: Data-Driven Insights for Optimization & Growth

Capstone project analyzing Amazon's sales and fulfillment data for performance improvements and strategic recommendations.

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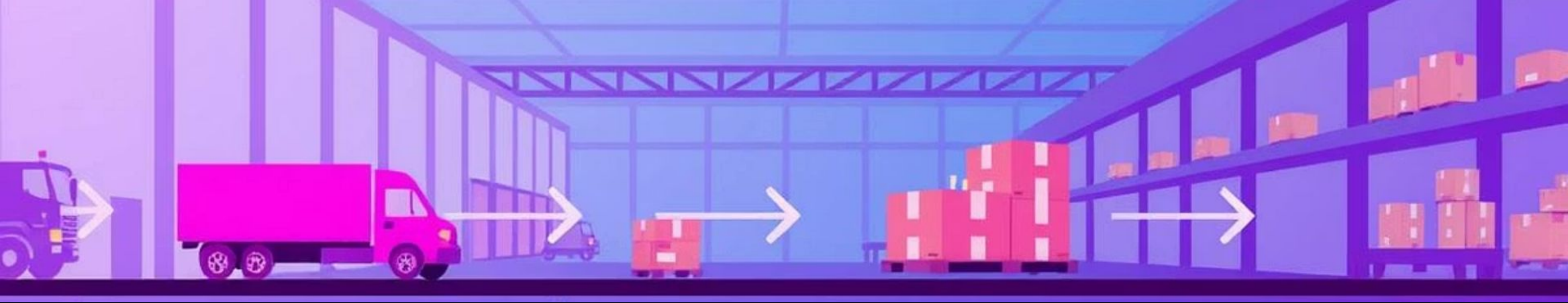
Data Science | April 2025

Amazon Sales & Fulfillment Overview

Amazon leads global e-commerce across B2C and B2B markets. It offers vast catalogs including fashion, electronics, groceries, and books. Dual fulfillment models enable flexibility and speed.

FBA lets Amazon handle storage, packing, and shipping; MFN lets sellers self-fulfill. Predictive analytics and real-time logistics drive faster deliveries and operational excellence.





Problem Statement & Project Objectives



High Order Cancellations

Linked to tracking issues, stockouts, and product detail gaps causing lost revenue.



Fulfillment & Delivery Challenges

Merchant Fulfilled Network experiences more delays and inconsistency than FBA.



Promotion Ineffectiveness

No discounts on many items reduce sales potential.



Project Objective

Analyze sales, delays, cancellations by fulfillment type and promotions to optimize performance.

Dataset Overview & Metadata

Dataset Source

Kaggle's "Amazon India Sales Report" with 128,975 rows and 22 columns.

Key Fields

Order ID, Date, Status, Fulfillment Type, SKU, Quantity, Amount, Courier Status, Promotions, Region.

Descriptive Stats & Completeness

- Average Quantity: 0.90, Max: 15
- Average Order Amount: ₹648, Max: ₹5,584
- Missing Data: Courier Status 5.3%, Promotions 38.1%, Fulfilled-by 69.5%

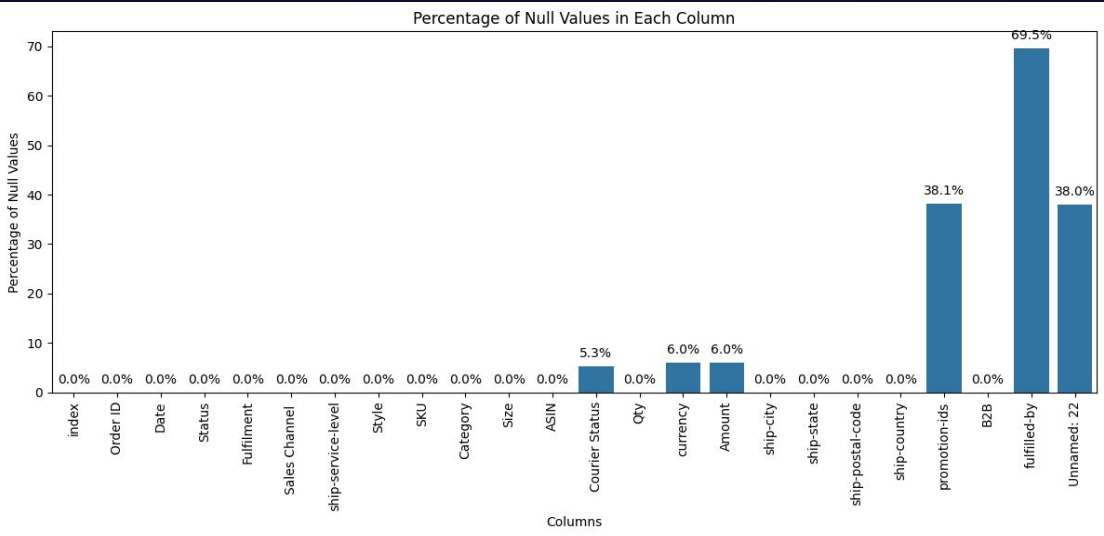
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	index	Order ID	Date	Status	Fulfillment Type	Sales Channel	Service	Style	SKU	Category	Size	ASIN	Courier Status
2	0	405-80787	04-30-22	Cancelled	Merchant	Amazon.in	Standard	SET389	SET389-KF Set	S		B09KXVBD7Z	
3	1	171-91981	04-30-22	Shipped	Merchant	Amazon.in	Standard	JNE3781	JNE3781-K kurta	3XL		B09K3WF5	Shipped
4	2	404-06876	04-30-22	Shipped	Amazon	Amazon.in	Expedited	JNE3371	JNE3371-K kurta	XL		B07WV4J1	Shipped
5	3	403-96153	04-30-22	Cancelled	Merchant	Amazon.in	Standard	J0341	J0341-DR- Western	L		B099NRC77B	
6	4	407-10697	04-30-22	Shipped	Amazon	Amazon.in	Expedited	JNE3671	JNE3671-T Top	3XL		B098714B	Shipped
7	5	404-14909	04-30-22	Shipped	Amazon	Amazon.in	Expedited	SET264	SET264-KF Set	XL		B08YN7XC	Shipped
8	6	408-57484	04-30-22	Shipped	Amazon	Amazon.in	Expedited	J0095	J0095-SET Set	L		B08CMHN	Shipped
9	7	406-78077	04-30-22	Shipped	Merchant	Amazon.in	Standard	JNE3405	JNE3405-K kurta	S		B081WX4C	Shipped
10	8	407-54430	04-30-22	Cancelled	Amazon	Amazon.in	Expedited	SET200	SET200-KF Set	3XL		B08L91ZZ	Cancelled
11	9	402-43937	04-30-22	Shipped	Amazon	Amazon.in	Expedited	JNE3461	JNE3461-K kurta	XXL		B08B3XF5	Shipped
12	10	407-56336	04-30-22	Shipped	Amazon	Amazon.in	Expedited	JNE3160	JNE3160-K kurta	S		B07K3YQL	Shipped
13	11	171-46384	04-30-22	Shipped	Amazon	Amazon.in	Expedited	JNE3500	JNE3500-K kurta	XS		B098117D	Shipped
14	12	405-55136	04-30-22	Shipped	Merchant	Amazon.in	Standard	JNE3405	JNE3405-K kurta	XS		B081XCM1	Shipped

Data Cleaning & Preprocessing



Tools Used

Python (Pandas, NumPy), plus Google Sheets/Excel for cleaning and organizing data.



Standardization

Standardized date formats and numerical values for consistency.

Status	Courier Status	Delay Flag
Pending	Unshipped, UNKNOWN	Yes
Shipping	Unshipped, UNKNOWN	Yes
Pending - Waiting for Pick Up	Unshipped, UNKNOWN	Yes
Shipped - Out for Delivery	Unshipped, UNKNOWN	Yes



Cleaning Steps

Removed irrelevant columns, contextually imputed missing values, flagged delays.



Feature Engineering

Created Delay Flag from Status and Courier Status fields.

Sales, Category & SKU-Level Analysis

Monthly Sales

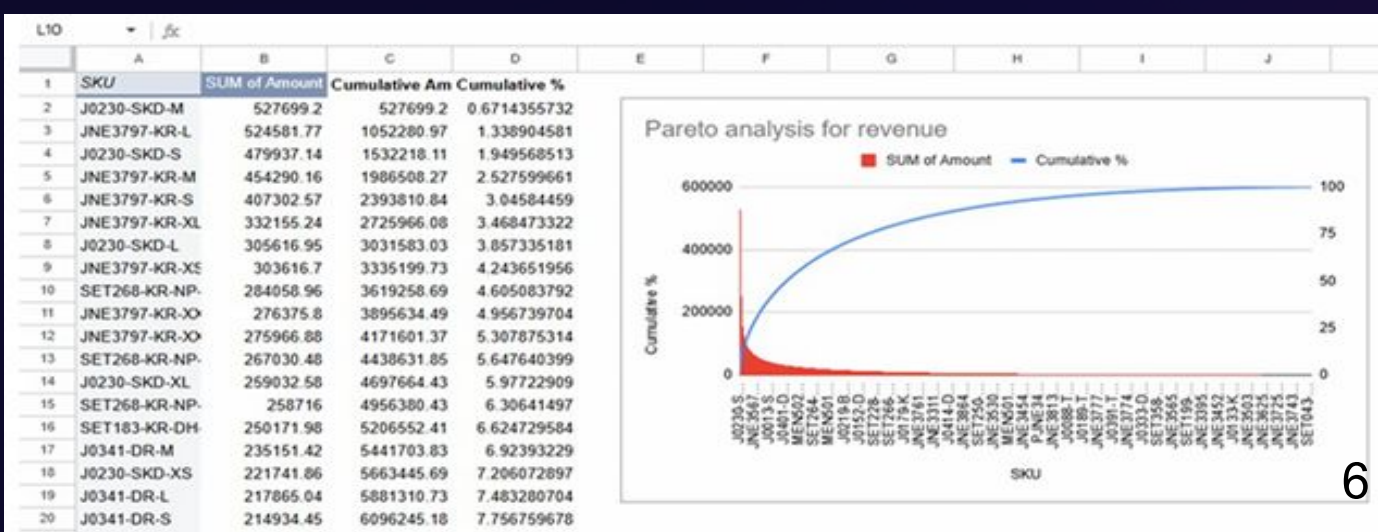
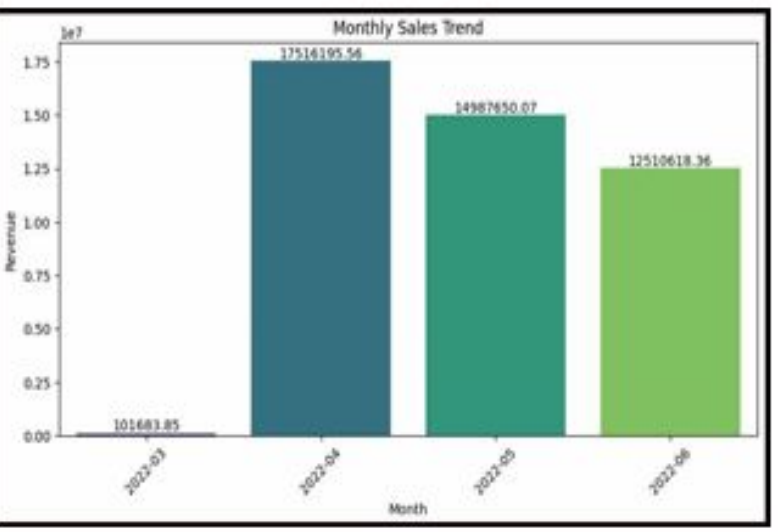
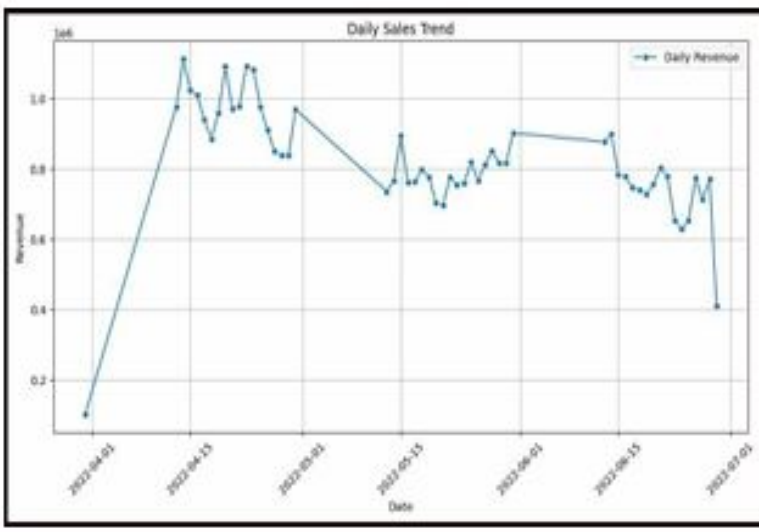
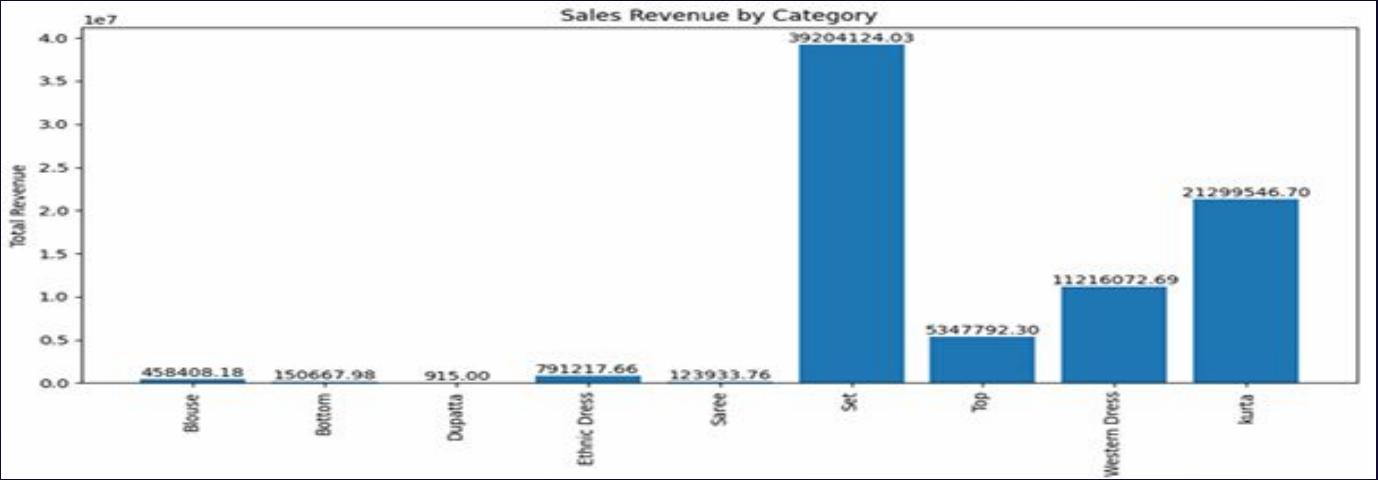
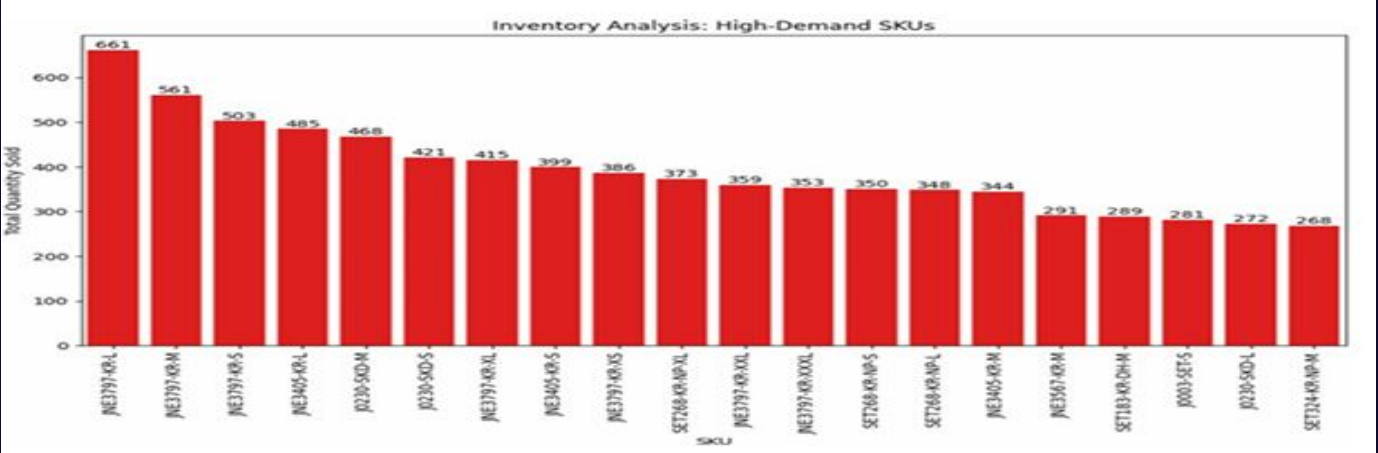
April peaked at ₹17.5M, May dropped to ₹14.9M, June declined to ~₹12.5M.

Seasonality and inventory imbalances affect overall sales volume.

Top SKUs & Revenue

- JNE3797-KR-L: 661 units sold
- KR-M: 561 units
- KR-S: 503 units

Top categories: Sets ₹39.2M, Kurtas ₹21.3M, Western Dresses ₹11.2M.
Pareto principle confirmed: 20% SKUs generate 80% revenue.

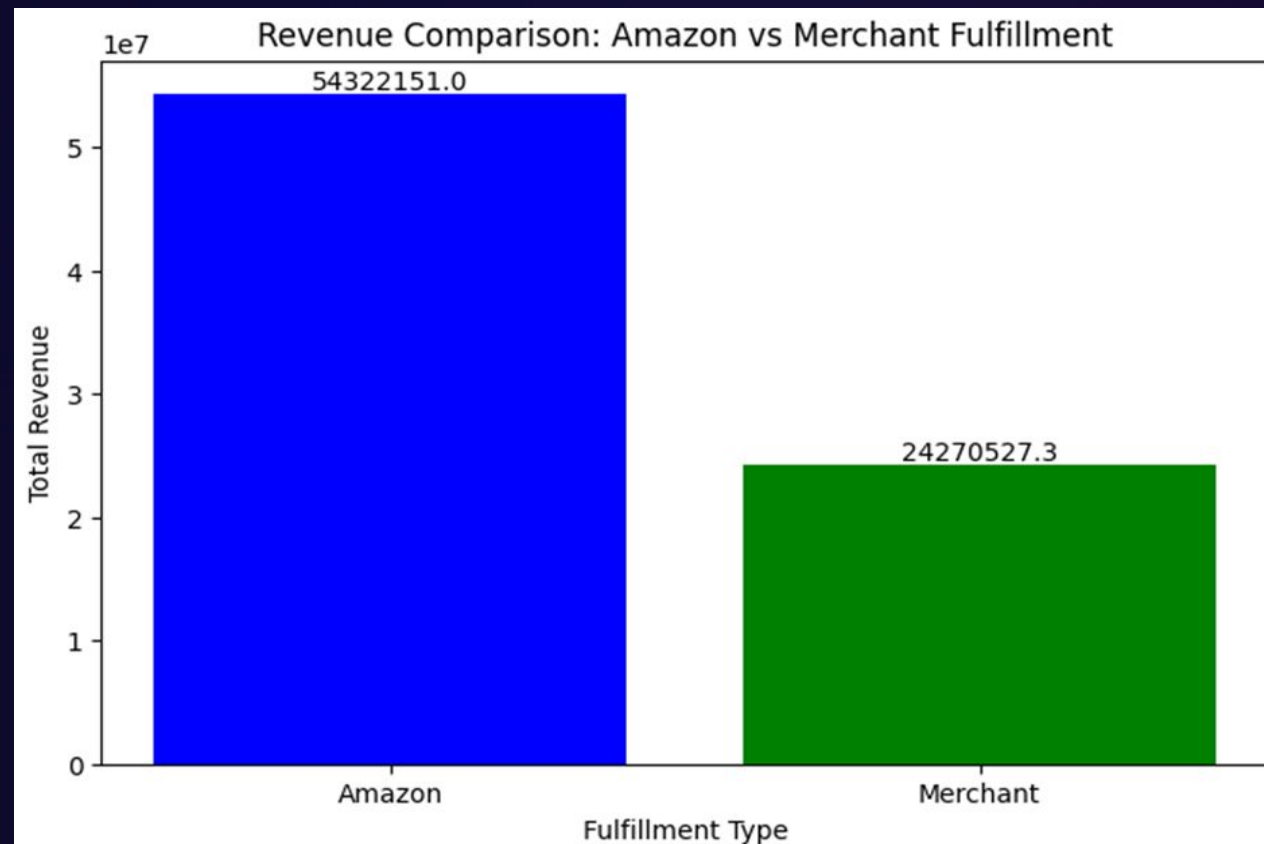


Fulfillment Method Analysis

Amazon Fulfillment (FBA)

Handled 89,698 orders generating ₹54.3M in revenue.

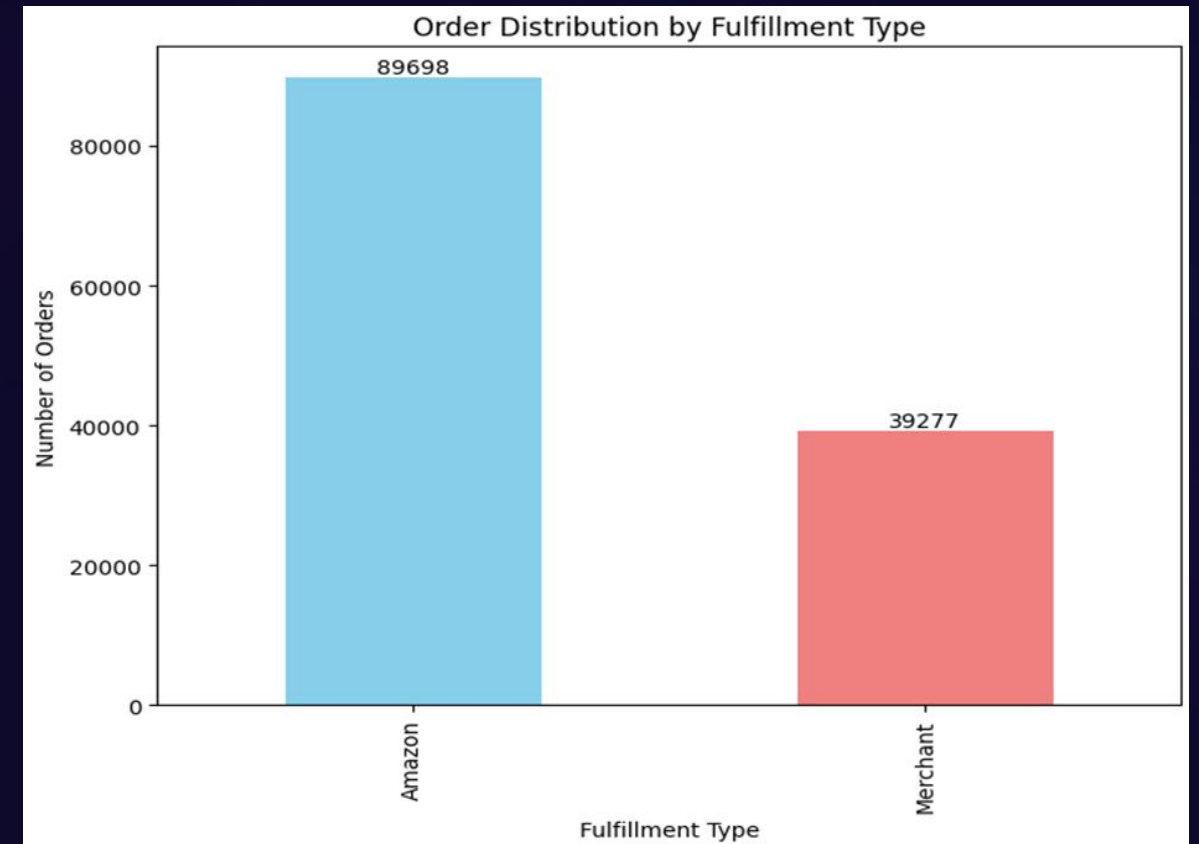
Fewer delays (411 incidents) and stronger tracking reliability.



Merchant Fulfilled Network (MFN)

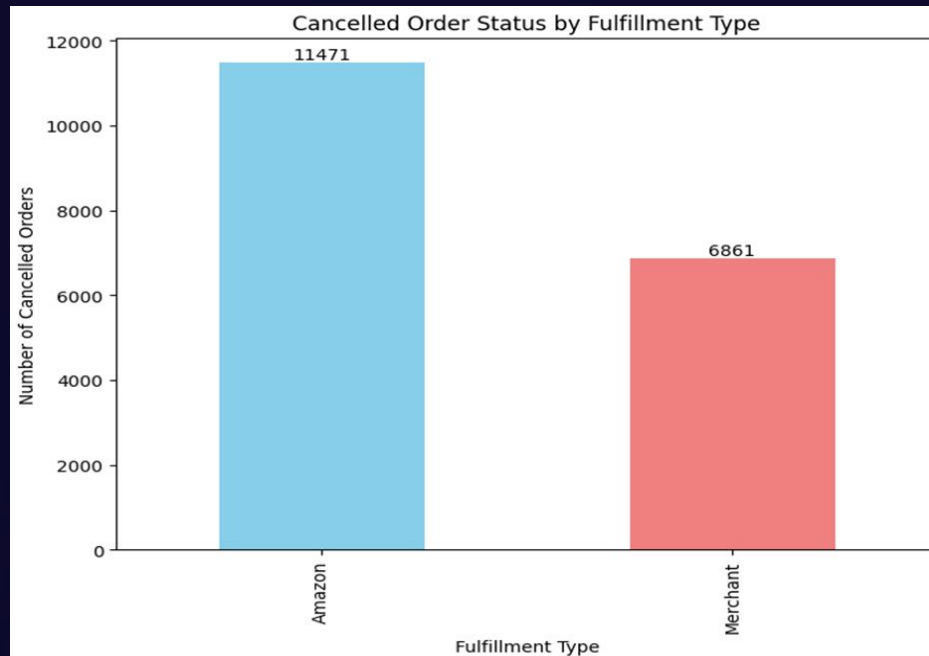
Handled 39,277 orders generating ₹24.3M in revenue.

Higher delays (524 incidents), impacting customer satisfaction.



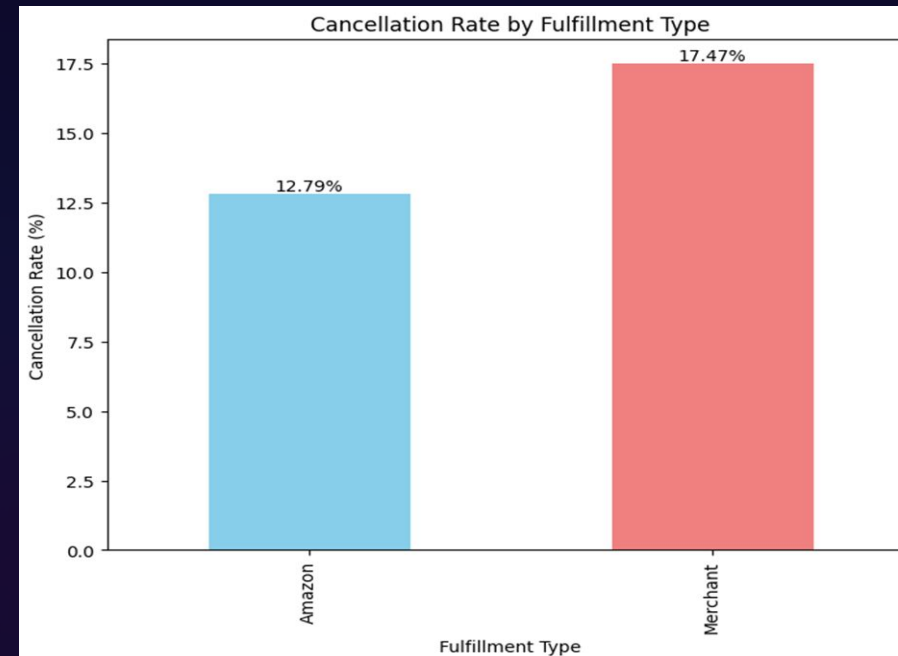
Cancellation & Delay Analysis

Operational Delays → Tracking Uncertainty → Customer Frustration → Increased Cancellations



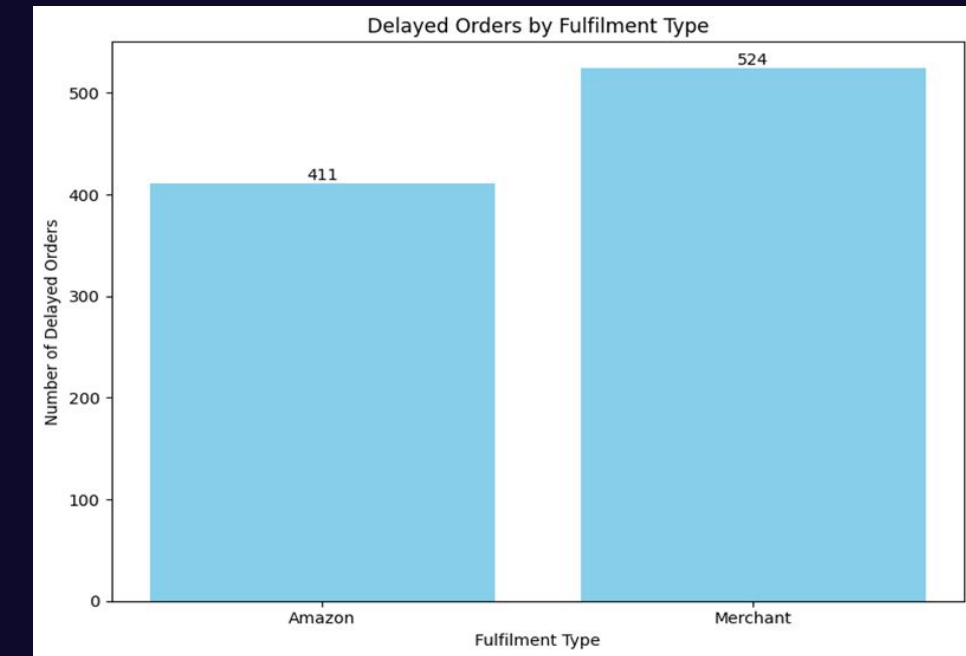
Cancelled Order Status

Amazon shows a higher number of cancellations due to its larger order volume. However, cancellation rate, not just absolute numbers, provides a clearer picture of the severity.



Cancellation Rates Comparison

Amazon FBA has a lower cancellation rate (12.79%) compared to Merchant Fulfilled (17.47%), reflecting logistics efficiency differences.

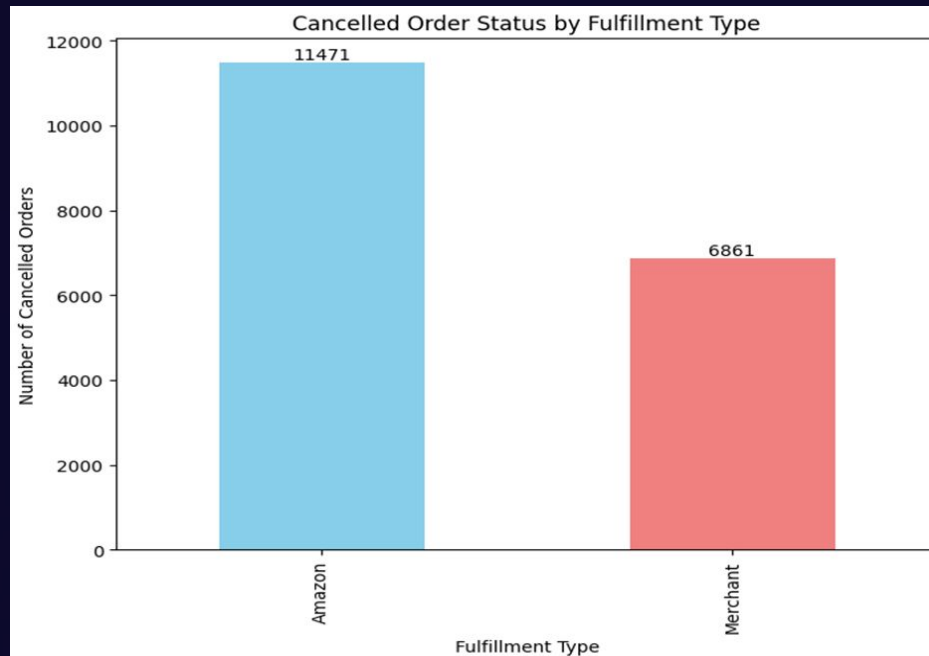


Delays Drive Cancellations

Merchant-fulfilled orders faced more delays (524 vs. 411 in Amazon). While not the sole cause, shipping delays can negatively affect customer satisfaction and increase the likelihood of cancellations, especially when delivery speed matters.

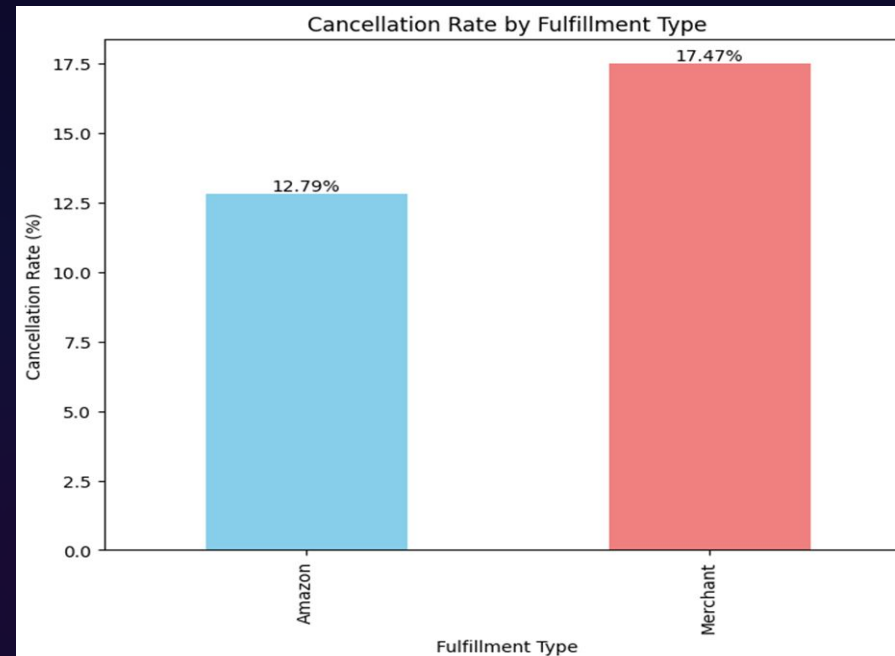
Cancellation & Delay Analysis

$$\text{Cancellation Rate} = (\text{Number of Cancelled Orders} / \text{Total Orders}) \times 100$$



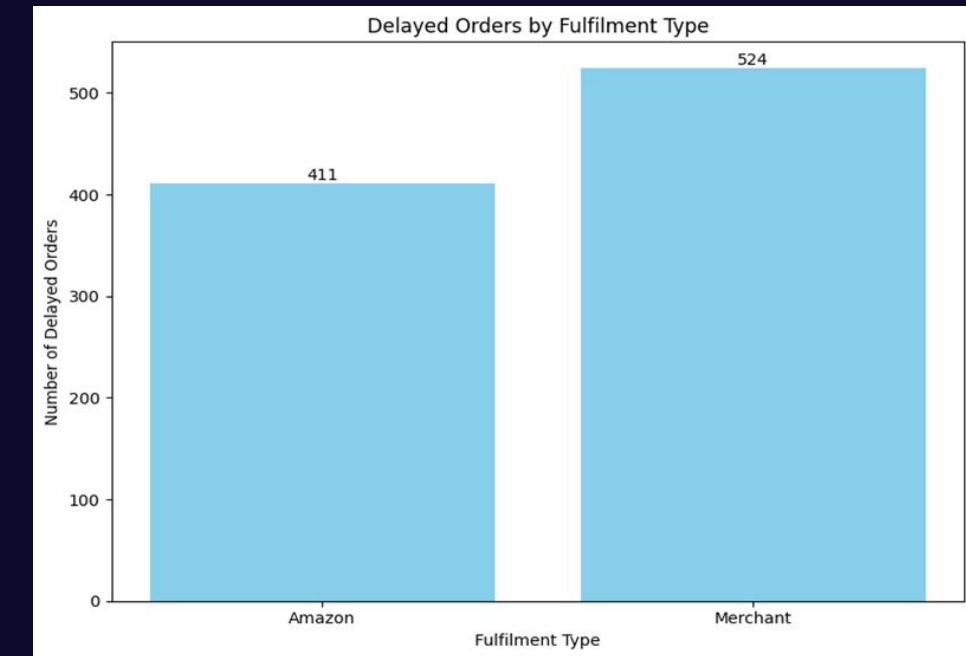
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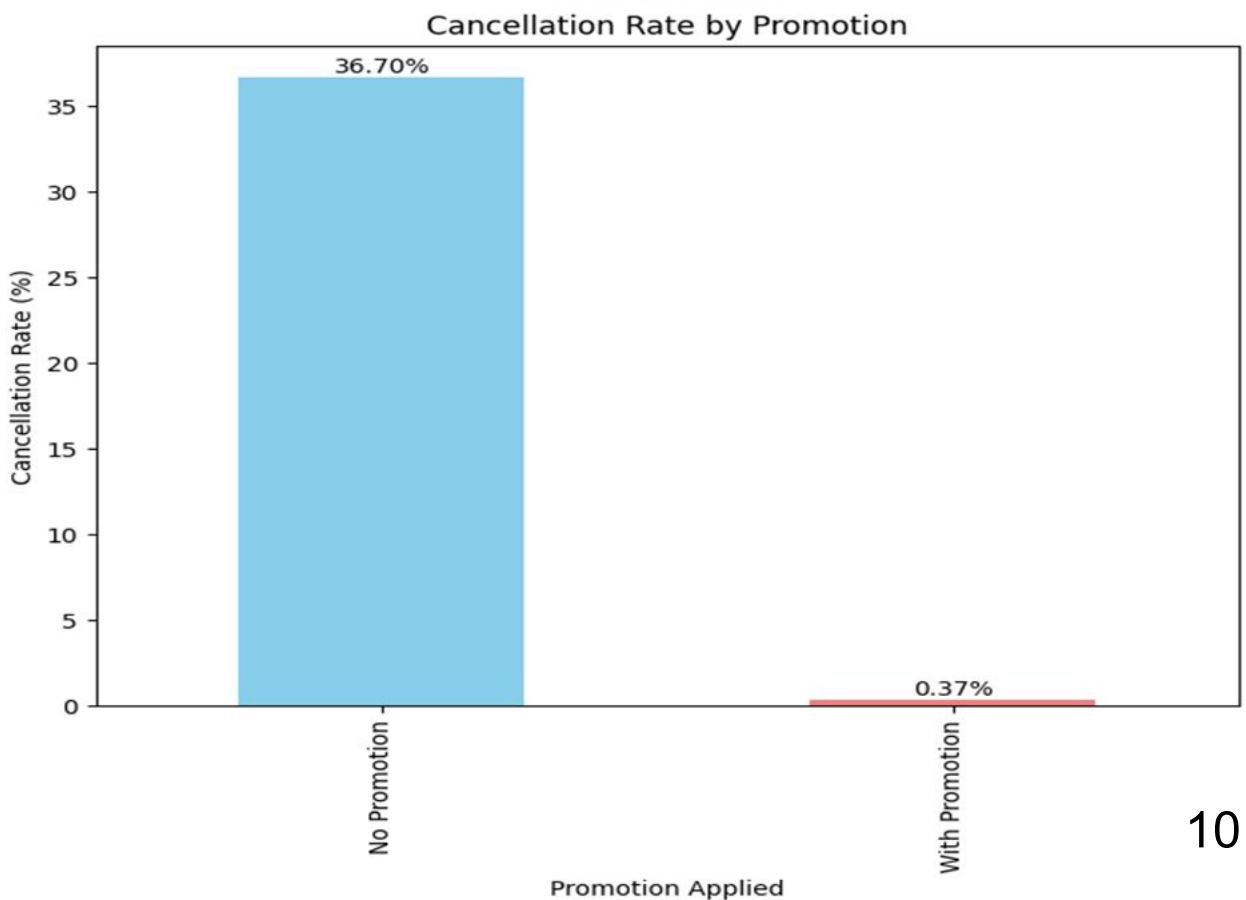
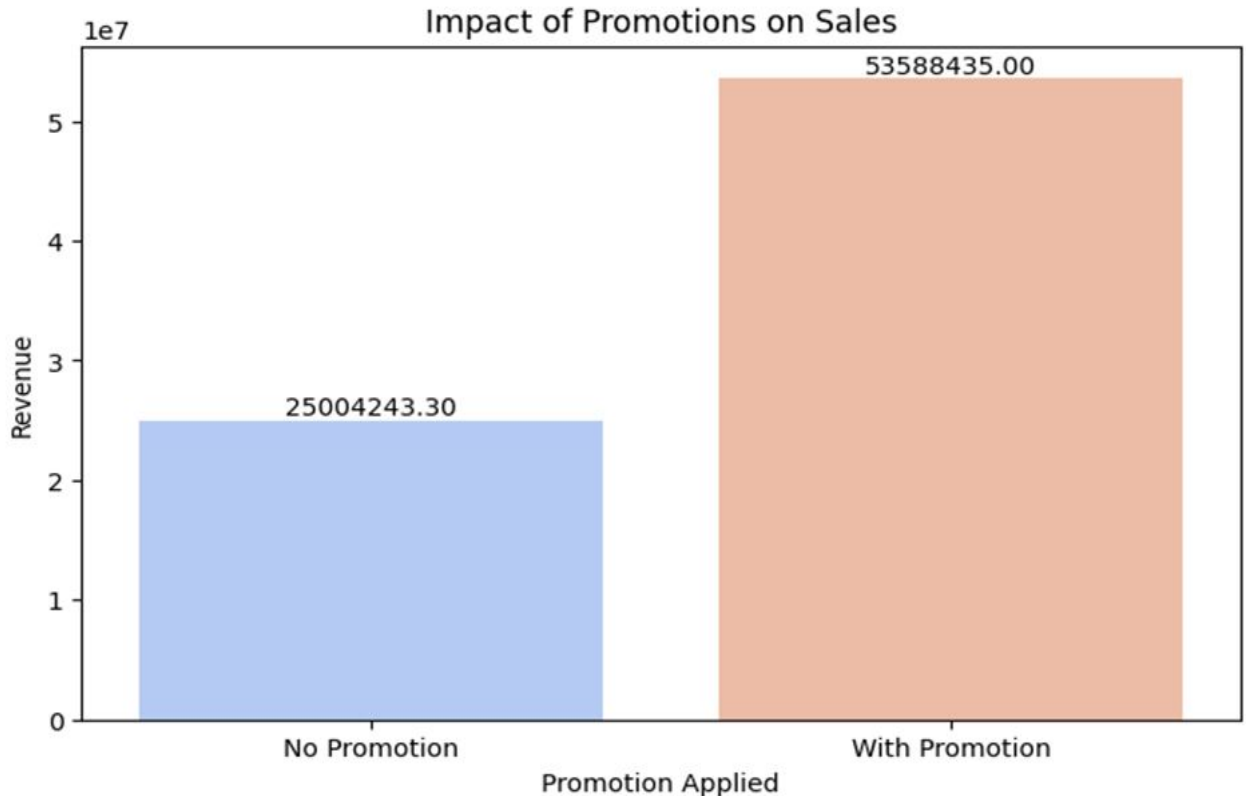
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Promotion Impact Analysis

Revenue Impact
₹53.6M revenue from promoted products versus ₹25M without.

Cancellation Rate
With Promotions: 0.37% cancellations
Without Promotions: 36.7% cancellations

Key Insight
Promotions significantly improve sales and reduce customer drop-offs.
Structured campaigns are vital for high-demand SKUs.



Interpretation of Results

Sales Volatility

Sales volatility from April to June indicates potential supply chain instability, stockouts, or fluctuating demand.

1

Performance Decline

While April shows peak performance (~₹17.5M), it's followed by a consistent drop (to ~₹12.5M in June), suggesting unresolved operational issues like poor inventory forecasting or logistics constraints.

2

Category Insights

"Set" and "Kurta" categories dominate both in sales volume and revenue, confirming strong customer preference and category reliability.

3



Interpretation of Results

Pareto Principle

Pareto Principle is validated: 20% of SKUs generate over 80% of revenue. Any disruptions to these high-impact SKUs disproportionately affect performance.

Fulfillment Performance

Amazon Fulfillment (FBA) significantly outperforms Merchant Fulfilled in all areas: order volume, revenue, and fewer delays.

Cancellations

Cancellations are clearly higher in merchant-fulfilled orders (17.47%) than in Amazon-fulfilled ones (12.79%), highlighting customer dissatisfaction caused by delayed shipping and poor courier tracking.

1 Delays & Cancellations
Delays are closely linked to cancellations, especially when courier status remains unshipped or unknown – strong correlation.

2 Promotions
Promotions have a transformative effect: doubling revenue and slashing cancellation rates from 36.7% to 0.37%. This shows that customers are more committed when incentives are aligned.

3 Underperforming Categories
Underperforming categories like "Dupatta" and "Saree" have minimal sales and should be reassessed for inclusion in future campaigns or inventory planning.

Recommendations

Fulfillment Optimization

- Increase orders processed via Amazon's fulfillment network—leveraging its lower cancellation rate (12.79%) and higher revenue.
- Standardize merchant procedures through real-time tracking and clear SLAs to reduce delays for Merchant Fulfilled orders.

1

2

3

Promotional Strategies

- Develop consistent, targeted promotional campaigns for key categories like Set and Kurta.
- Incentivize prepayment with discounts or loyalty rewards to substantially reduce cancellation rates.

Inventory Management

- Implement dynamic reordering based on real-time data to ensure high-demand SKUs such as JNE3797-KR-L and JNE3797-KR-M are always stocked.
- Regularly perform SKU rationalization to focus on the top 20% of SKUs driving 80% of revenue.

Customer Retention

- Enhance order tracking and communication systems for real-time updates.
- Refine product listings with improved descriptions and quality control to minimize cancellations.

Operational Efficiency

- Automate order processing to reduce errors and expedite dispatch.
- Strengthen courier coordination through real-time tracking and performance incentives to cut delays.