



IIT Madras

BDM Capstone Project

Optimizing Sales and Problems
faced by Ethnic Fashion Brand



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Organization Background

- **Brand:** Adornia an Ethnic Fashion Brand
- **Brand Type:** B2C e-commerce enterprise ethnic wear retailer for women
- **Location:** First Floor, A, 20, Sector 5, Noida, Uttar Pradesh 201301
- **Founder:** Mr. Gaurav Dwivedi
- **Background:** Founded in 2023 by Gaurav Dwivedi, Adornia is a 24/7 digital-first fashion brand blending superior craftsmanship with modern ethnic and luxury design.

Business Problem

- Irregularities in sales
- High product returns
- Market competition especially involving large-scale entities like Aditya Birla and Reliance Retail.



Data Collection

Primary sales data was collected through direct interaction with Adornia's owner and extracted from the Uni-commerce platform over a 7-month period (Aug 2024 – Feb 2025). The data was exported in 3-month intervals, then consolidated into a single file and analyzed using Excel, Python, and supporting libraries. The original dataset had 132 columns and 5,863 rows, which was refined to 45 relevant columns and 5,860 rows after preprocessing.



Objective and Methodology

Objective: The aim of the project is to analyze Adornia's primary sales data to uncover key insights that can help optimize sales, reduce product returns, and strengthen the brand's position in the ethnic fashion market.

Methods of Analysis: After a rigorous data cleaning and preprocessing operation, 7 methods of analysis were deployed on the preprocessed dataset.



Sales Time Series Forecasting (SARIMA)

Explanation

- Trained SARIMA model on 7-month sales data after handling missing values through interpolation
- ADF Statistic and p-value < 0.05 confirmed the data's stationarity, making it suitable for SARIMA
- ACF plot showed strong seasonal lags; recurring sales patterns
- PACF plot indicated significant influence of past sales on future values
- Model used: SARIMAX(1,0,1)×(1,0,1,12)
- High AR coefficient (0.8004) indicates a strong dependence on past sales
- Low MA coefficient (-0.1566) indicates a minimal correction from prior errors
- Model fit is good with low AIC (10.000) thus its statistically efficient forecast

Results and Findings

Adornia experiences a significant increase in sales during festive months, with a noticeable peak in October likely driven by heightened demand around festival celebrations like Diwali and Dussehra. In contrast, sales dip during non-festive periods.

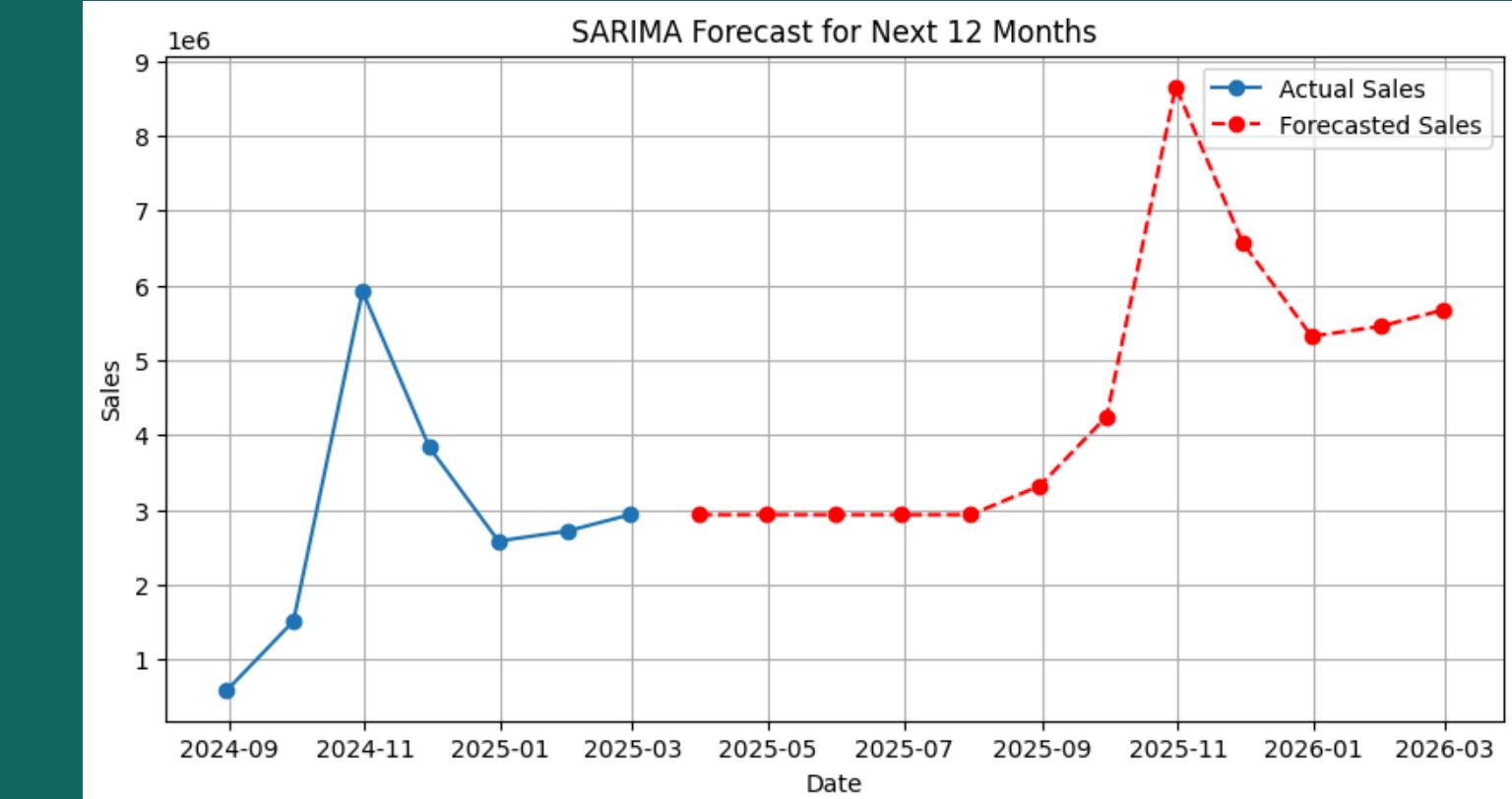


Fig 1: Sales Forecasting

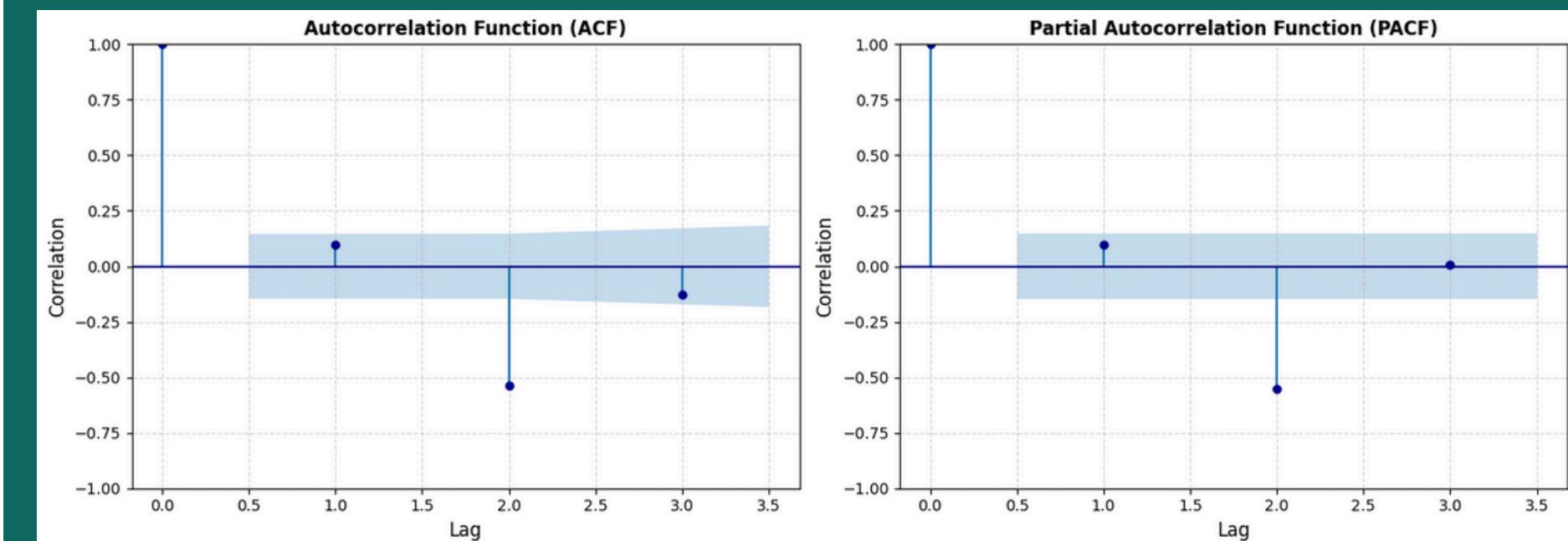


Fig 2: ACF and PACF Plots

Test Results	
ADF Statistics	-4.50927
P-value	0.00018
AR	0.8004
MA	-0.1566
AIC	10.0000
Model	(1,0,1)×(1,0,1,12)

Market Basket Analysis

Explanation

To uncover customer purchase patterns and support cross-selling, we applied Market Basket Analysis using the Apriori algorithm. This helped identify frequently bought item combinations, enabling smarter product recommendations and effective bundle promotions.

Results and Findings

- The choropleth map highlights Adornia's order volume across Indian states
- Top Performers are **Uttar Pradesh (935)**, **Maharashtra (830)**, **Delhi (495)**. Emerging States are **Karnataka (482)**, **Haryana (470)**, **Gujarat (310)**. Opportunity Zones states: **Odisha (112)**, **West Bengal (215)**.
- Association rules were derived to uncover frequently bought item pairs using Support, Confidence, and Lift:
- Most item combinations show low lift values (e.g., **Brocade Co-Ord Set + Printed Tunic**), suggesting weak associations.
- A strong co-purchase trend was found between **Floral Embroidered Ethnic Dress with Dupatta and Thread Work Kurta with Dhoti Pants (Lift = 166.7)**.
- Moderate associations (Lift = 6.5–6.8) exist among traditional ethnic styles.

Order Count by State in India

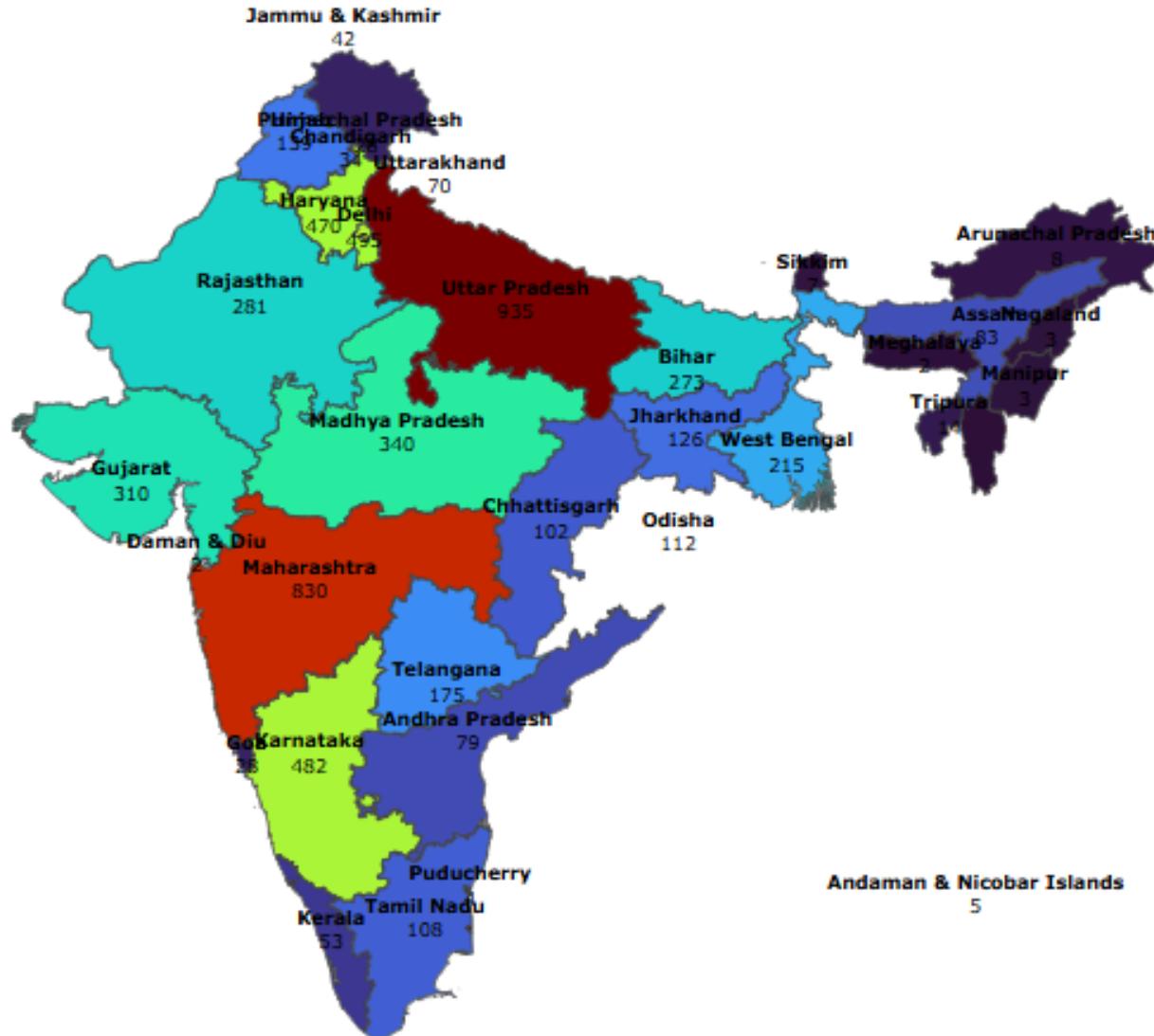


Fig 3: Choropleth map

[Link to MBA Analysis](#)

Price Elasticity of Demand Analysis

Explanation

To assess the impact of price changes on product returns, we performed a Price Elasticity of Demand analysis. This analysis examined how variations in selling price influenced both sales volume and return rates.

Results and Findings

- Low Sensitivity:** Most products have low PED; price changes have minimal impact on demand.
- High Returns = High PED:** Products with high return rates are more price-sensitive, hinting at buyer's remorse or perceived unfair pricing.
- Return Buckets:** The 57.43%–70.07% return rate group shows the highest average PED, indicating strong price sensitivity.
- Unpredictable Demand:** Price vs. quantity scatter shows that while many products remain stable, some react sharply to price shifts caution is needed with aggressive pricing.

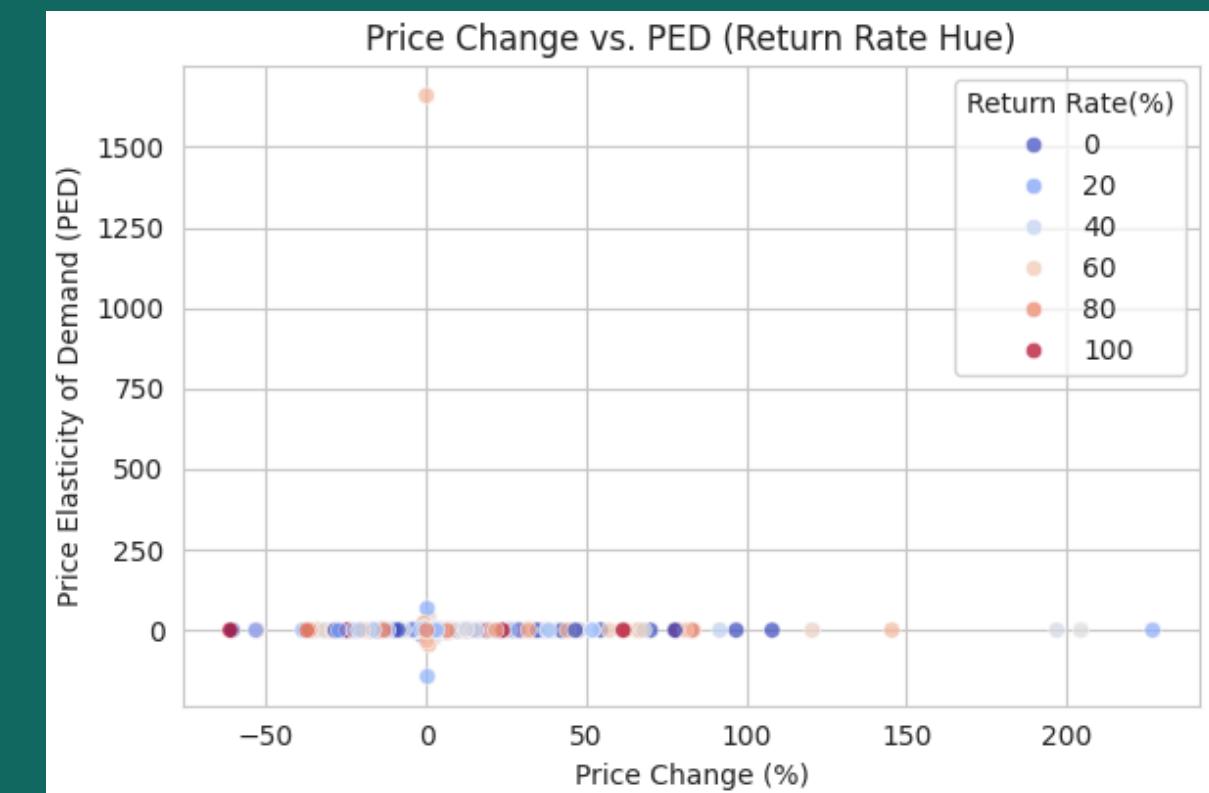


Fig 4: Scatter Plot

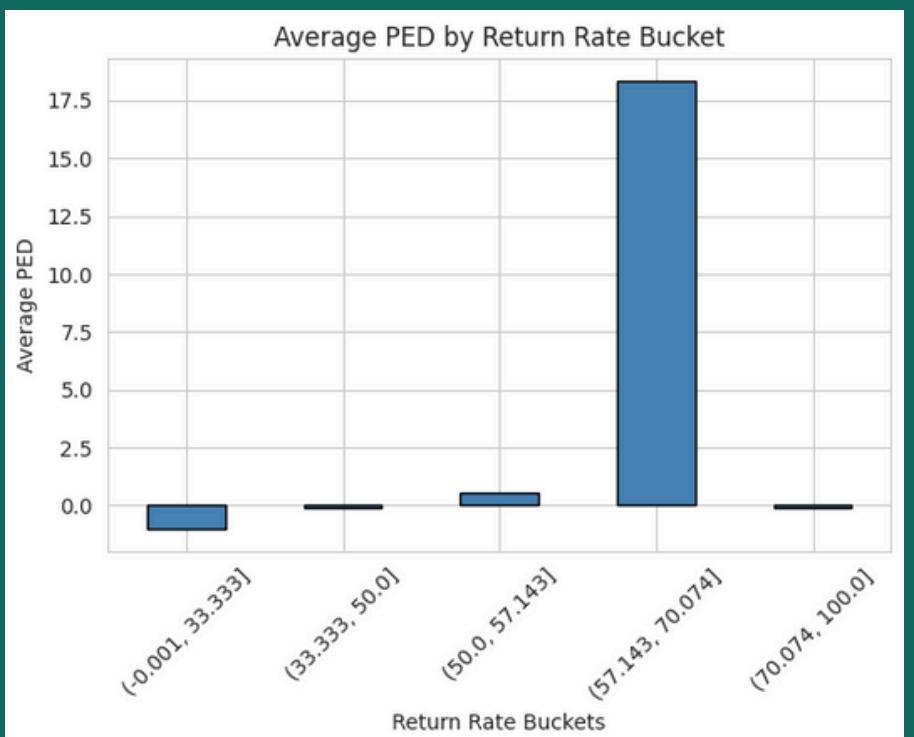


Fig 5: Bar Plot

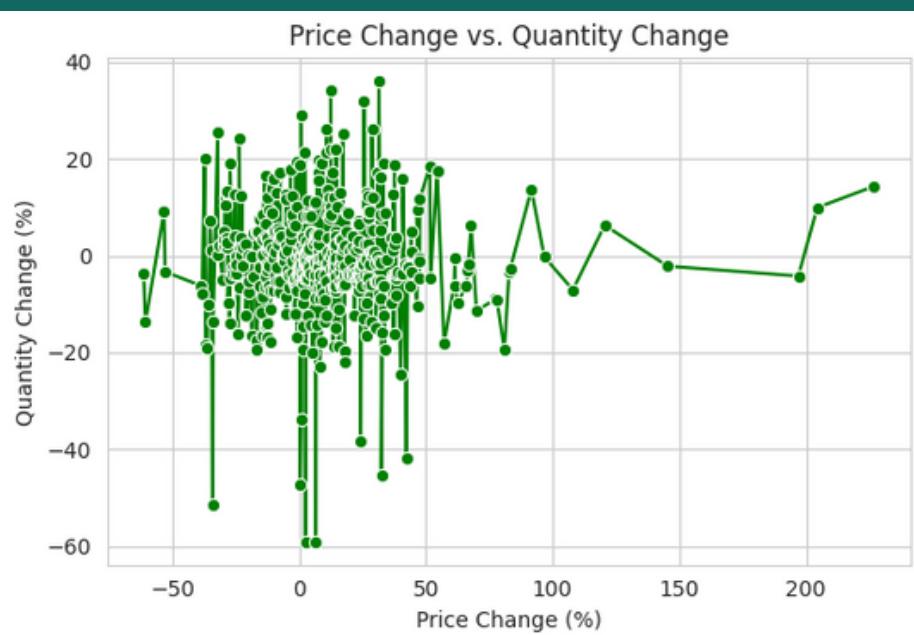


Fig 6: Scatter plot with connected lines

Customer Segmentation Using K-means Clustering

Explanation

In order to address the problem of market competition, the customer segmentation was performed using K-Means clustering in order to categorize customers in terms of spending habits and sensitivity to discount.

Results and Findings

- **Elbow Method:** Optimal clusters = 3, balancing performance and simplicity.
- **Cluster Summary (Spending vs. Discount):** Cluster 0 (Blue) includes low spenders with low discount usage, showing high price sensitivity. Cluster 1 (Orange) features high spenders who rely on discounts, indicating loyalty or deal-driven behavior. Cluster 2 (Green) includes mixed spenders with minimal discount use, reflecting steady or premium buying habits.
- **Discount Sensitivity (Box Plot):** Cluster 1 is Highly discount-sensitive, Cluster 2 is Moderately sensitive, and Cluster 0 is Not discount-driven.
- **Spending (Bar Chart):** Cluster 2: Highest average spend (~₹3,600). Cluster 0: Strong spenders (~₹3,350). Cluster 1: Lowest spenders (~₹2,600).

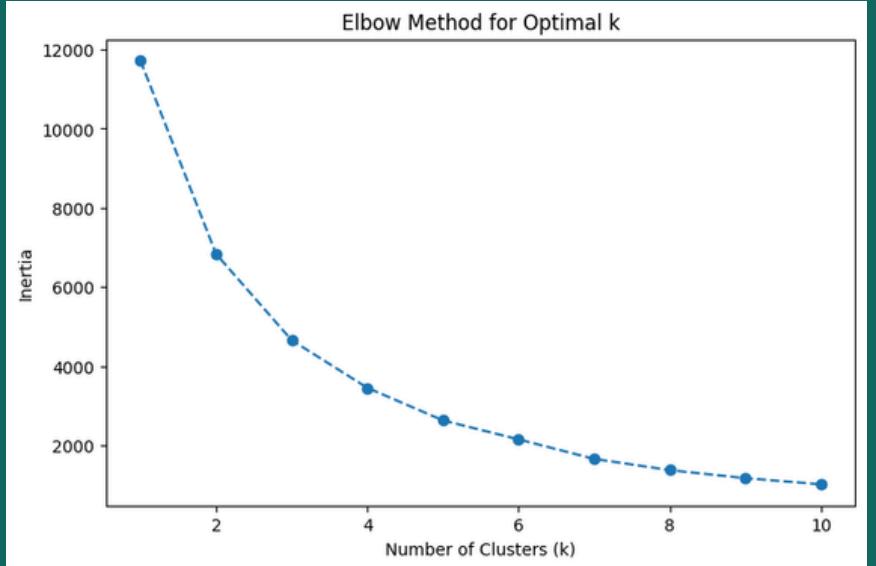


Fig 6: Elbow Plot

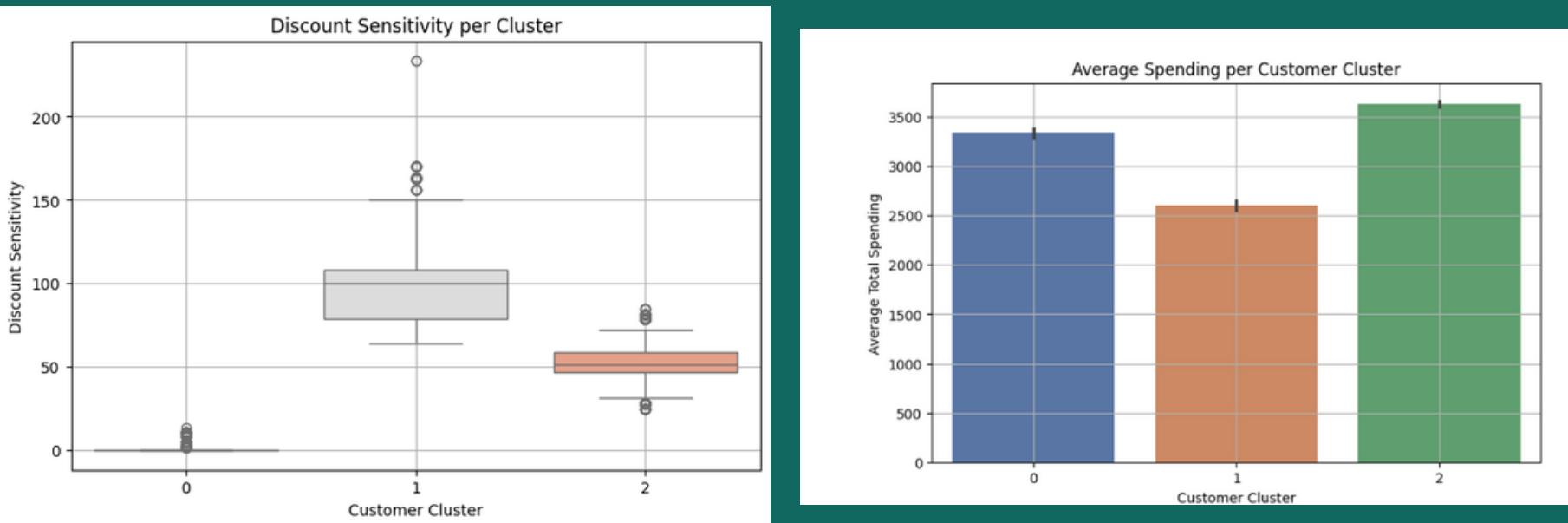


Fig 7: Box Plot

Fig 8: Bar Chart

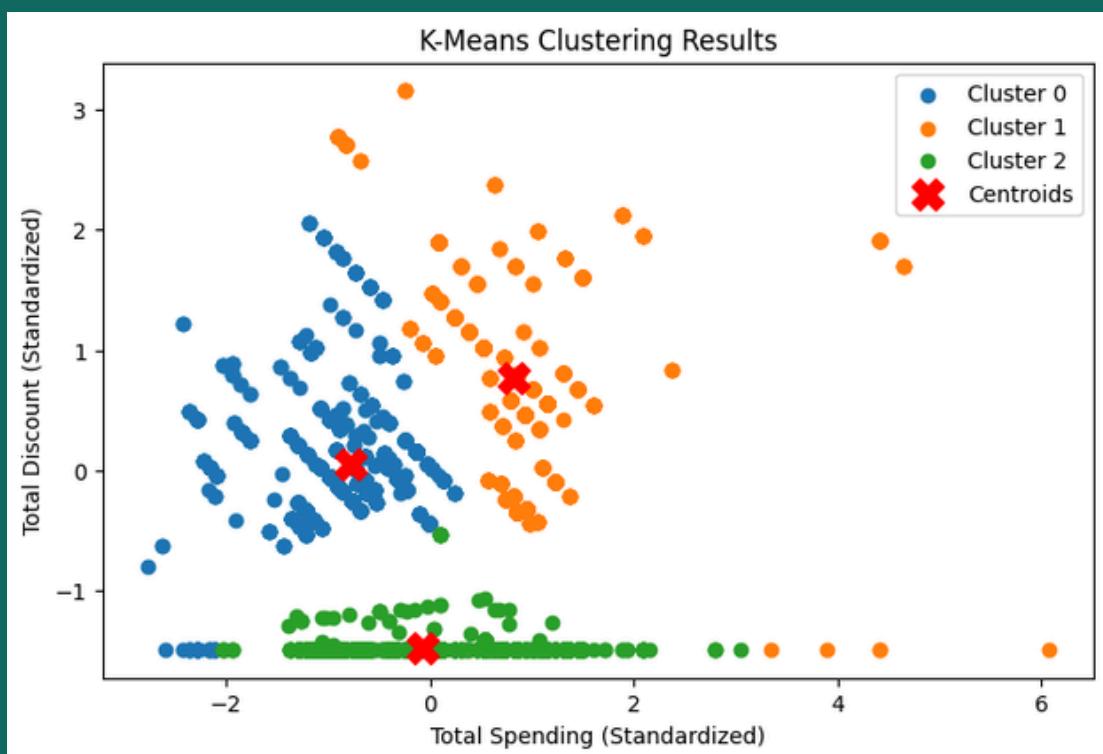


Fig 9: K-means Clustering

Logistic Regression Analysis

Explanation

To analyze factors driving product returns, logistic regression was applied using discount, selling price, and payment method (COD VS Prepaid) as inputs. The goal was to assess whether discounts or payment modes significantly increase the likelihood of a return.

Results and Findings

- Higher selling prices increase return risk; possibly due to unmet expectations.
- Higher discounts reduce returns; customers feel they're getting better value.
- **Key combo:** High price + low discount → most returns and Low price + high discount → least returns
- Smart discounting on expensive items can help.
- **Payment Method:** No strong statistical impact, but Prepaid shows higher return trend (65%) than COD (45%).
- Reflects different customer behaviors.
- Model's R² is low (0.0020) other factors (e.g. product quality, sizing issues, or delivery delays) likely affect returns.

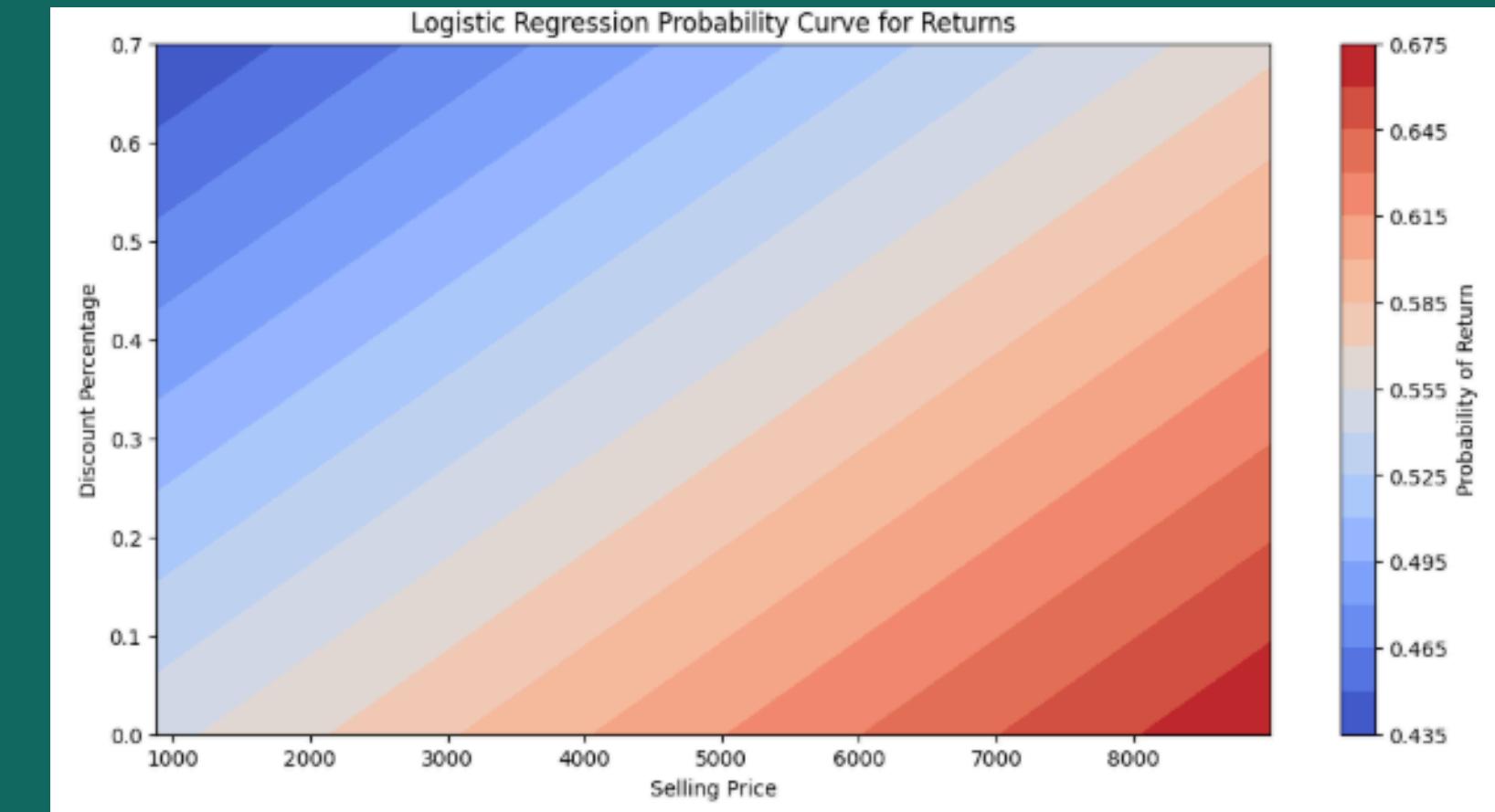


Fig 10: Pobability Heatmap

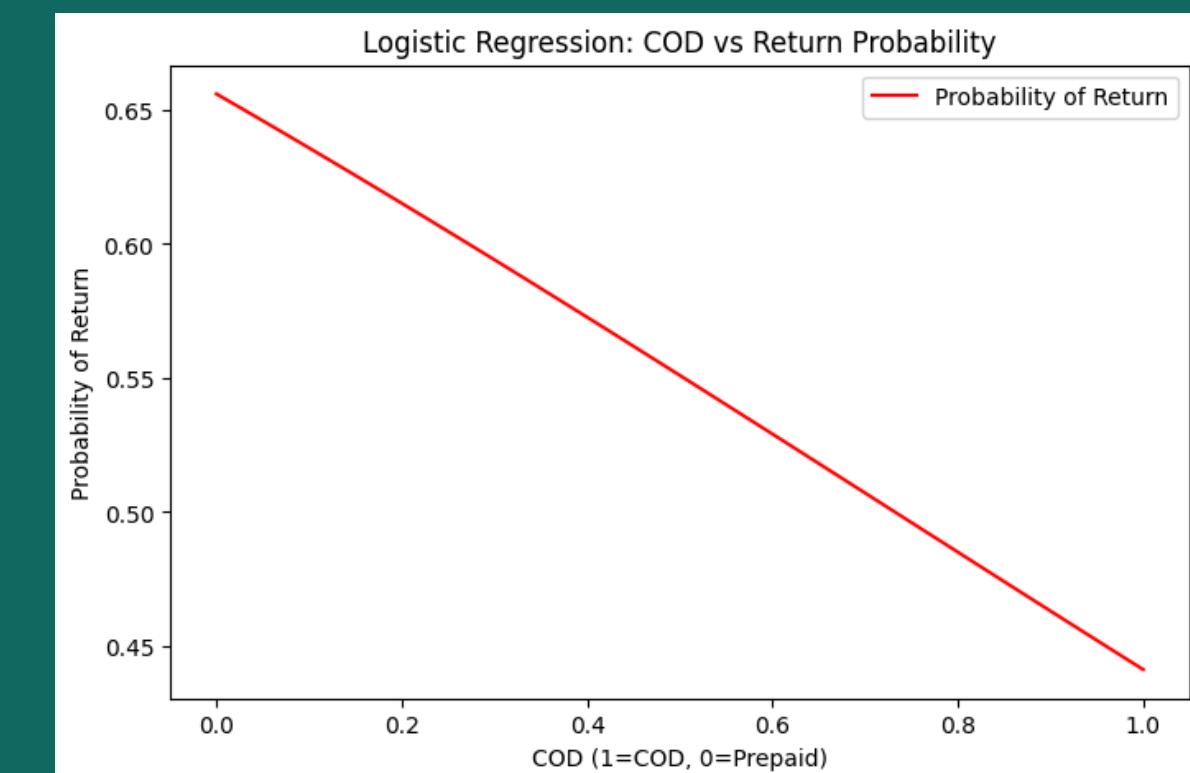


Fig 11: Line graph

Recommendations

Implementing the below strategies will stabilize sales, cut return-related losses, and boost competitiveness. By aligning operations and marketing with customer behavior and regional demand, Adornia can drive profitability, improve efficiency, and build long-term customer loyalty for sustainable growth.

01

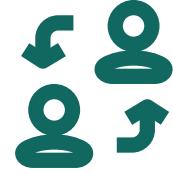


Sales Irregularities

Forecast-Driven Planning: Use SARIMA forecasts for seasonal inventory and campaign alignment by Q3 2025.

Strategic Regional Expansion: Boost presence in Odisha & West Bengal by replicating high-performing state models.

02



Product Returns

Smart Discounting: Target high-return, high-PED items with tailored discounts to reduce returns.

Prepaid Engagement: Launch post-purchase SMS/email campaigns for prepaid buyers starting May 2025.

Root Cause Fixes: Improve training, automate returns, upgrade product quality, and clarify refund policies.

03



Market Competition & Targeting

Segmented Campaigns: Deploy K-Means-based promotions customized by customer clusters (Q2 2025).

Ethnic Bundles: Introduce festive-season combo offers using Market Basket Analysis.

Tech-Driven Experience: Use AR/VR try-ons, 3D product previews, and CRM personalization to cut returns.

04



Strategic Positioning

Sustainable Differentiation: Focus on niche, premium, and eco-conscious fashion segments.

Omni-Channel Growth with Artisan Appeal: Combine digital retail and select stores with artisan-made, ethical products to attract conscious buyers.

Agile & Data-Led Marketing: Use analytics for real-time insights and sharper brand positioning.



*Thank
You*

THANK YOU!
For watching this presentation

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