Lakshit Gupta – Discount Optimization Logic

Repository

GitHub Repository: Online Sales Analysis

Overview

This report focuses on improving profit margins in retail sales by analyzing how discounts affect profitability across different U.S. states. We started by identifying that states with high sales like California, Texas, and Florida often have low or negative profit margins. A strong negative correlation (−0.62) between discount rates and profits confirmed that heavy discounting is reducing earnings.

To address this, we first applied a flat 6% discount drop, which improved profits by ₹35.41K (+12.36%) without hurting sales. Then, we proposed a more targeted, dynamic approach—adjusting discounts by state using Power BI slicers—to get better, customized results. Seasonal trends were also studied to time discounts more strategically. This approach helps companies improve profits while keeping their competitive edge.

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1. State-Level Sales & Profitability Trends

An initial state-wise analysis of sales and profitability revealed critical patterns that shaped the discount optimization strategy.

- **Key Profitability Observations:**
  - **California**: ₹68.5K profit on ₹322K sales → ~21% margin
  - **Texas**: ₹53.2K profit on ₹278K sales → ~19.1% margin
  - **Florida**: −₹8.2K loss on ₹93.5K sales → Negative margin
  - **Wisconsin**: ₹11.2K profit on ₹29K sales → ~38.6% margin
  - **Ohio**: ₹12.4K profit on ₹32K sales → ~38.7% margin

- Despite having high sales volumes, states such as California, Texas, Florida, Ohio, and Illinois demonstrate significantly lower profit margins—Florida, Illinois even incur a net loss. This trend implies that deep discounting or operational inefficiencies are eroding profits in high-volume states.

- Conversely, states like Wisconsin and Ohio, with moderate sales figures, reflect much healthier margins, likely owing to disciplined discounting.
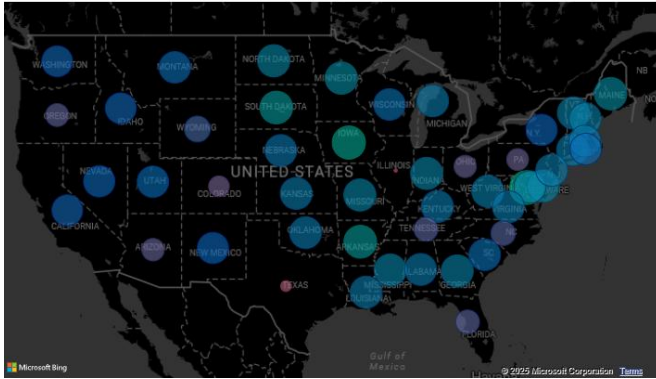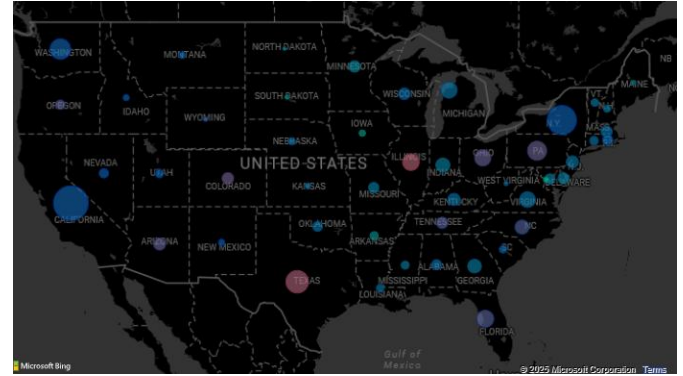
Fig1: Profit Margin across USA

Fig2: Sales Trend across USA

- A Pearson correlation coefficient of −0.62 between average discount and profit indicates a strong negative correlation, as discounts rise, profits fall.
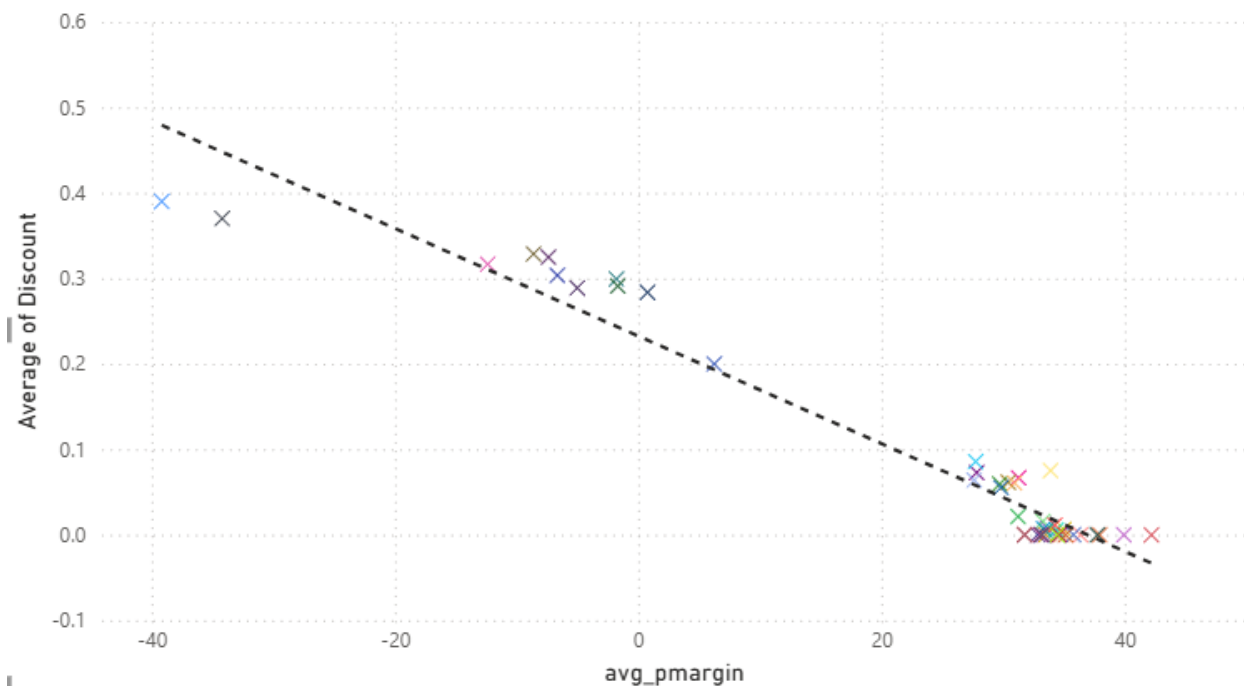

Fig3: Visualization of Correlation between Average Discount and Profit Margin

- Additionally, a linear relationship between Sales and Logistics Costs was observed, confirming that higher sales are often accompanied by proportionate increases in costs.

This analysis guided the need for optimized discounting to protect profitability without suppressing demand.

2. Flat Reducer Implementation: 6% Discount Reduction Across All Transactions

To address margin erosion, a flat reduction of 6% on all discounts was applied across transactions. The calculation used:

Updated Discount = max(Original Discount – 0.06, 0)

This ensures that discounts never fall below zero, while systematically trimming excess values. The Updated Discount Measure represents the average of all updated discount values post-reduction.

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4. Results: Profit Uplift from Uniform Reduction Strategy

By applying the flat 6% discount reduction strategy (floored at 0), the following uplift in profitability was achieved:

- **Profit Before Reduction**: ₹286.4K
- **Profit After Reduction**: ₹321.81K
- **Absolute Increase**: ₹35.41K
- **Relative Increase**: +12.36%

Updated Profits and Sum of Profit

₹ 286.4K

₹ 321.81K

₹ 0K   ₹ 643.62K
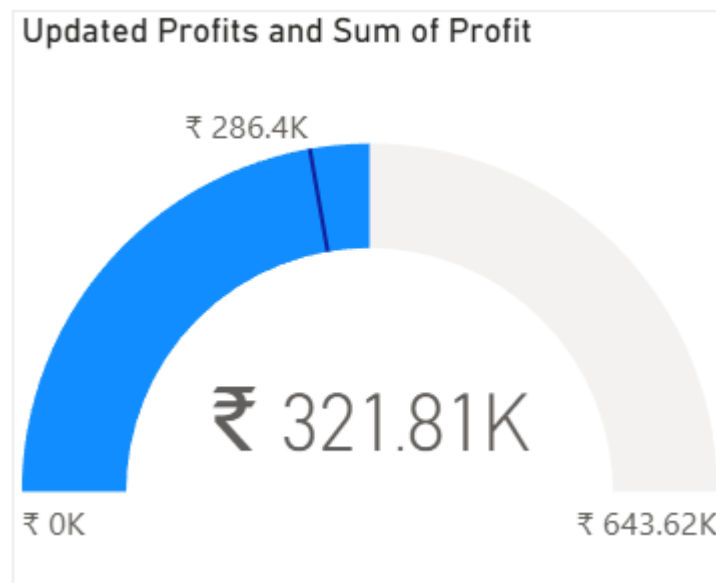
This profit recovery was accomplished without affecting sales volume, demonstrating the efficacy of judicious discounting.

5. Moving Toward Dynamic Discounting

While a flat 6% reduction yields improvement, a more refined strategy involves state-specific discount reductions, tailored to performance.

- **Advantages of Dynamic Discounting:**
  - Improved Precision: Reduces only in high-discount, low-margin states.
  - Preserves Competitive Pricing: Avoids zeroing discounts in states already operating below a 6% average.
- **Implementation Strategy:**
  - Use Interactive Slicers: Power BI slicers enable users to select different drop rates and assess outcomes visually.
  - Profit Graph Comparisons: Help evaluate which reduction level yields maximum profitability.
  - **Set Personalized Rates**: For instance:
    - California → Drop by 0.04
    - New York → Drop by 0.03
    - Florida (loss state) → Drop by 0.07
- **Elasticity Testing**: Monitor how small discount changes affect sales to avoid unintended revenue drops.

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6. Seasonal Trends and Dynamic Timing

Sales and profit data from 2011 to 2013 reveal **recurring seasonal trends**:
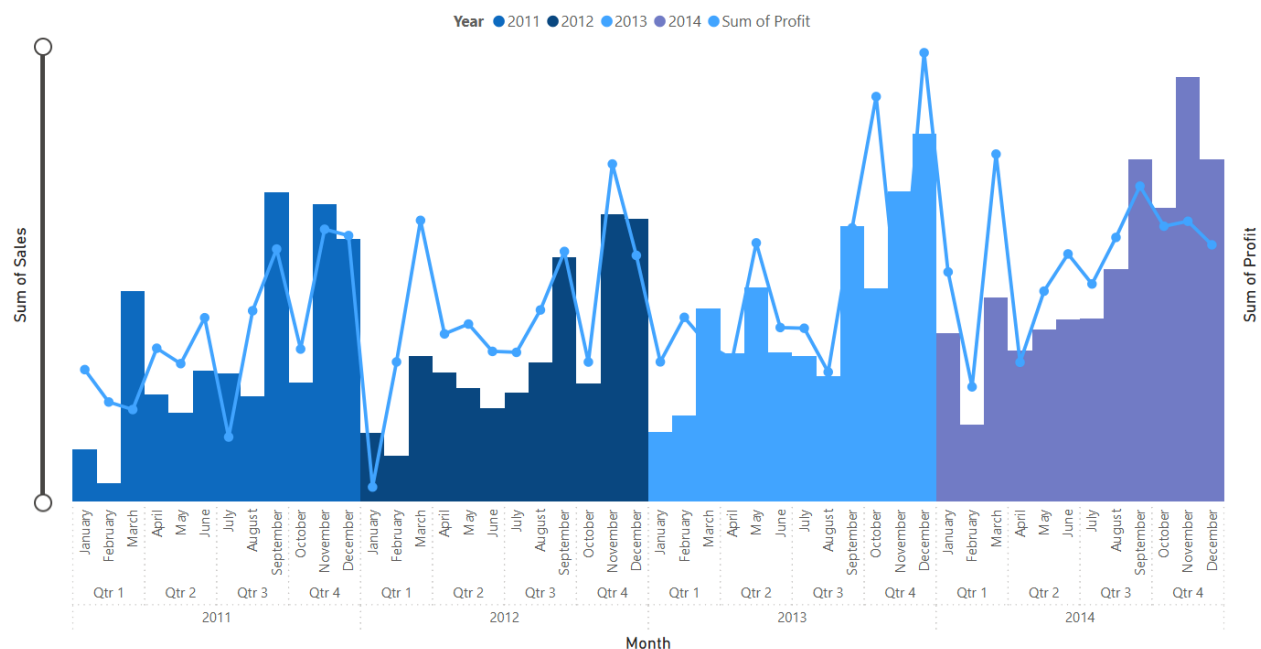
- Q3 and Q4 (especially October to December) consistently show spikes in both sales and profits.

Strategic Takeaways:

- Use Discounts Tactically:
    - Apply higher discounts during Q1 and Q2, when demand is low, to stimulate volume.
    - Minimize discounts in Q3 and Q4, when demand is naturally high, to protect margins.

Conclusion

The combination of state-wise profitability analysis, correlation insights, and seasonal sales patterns supports a hybrid strategy:

- Start with flat 6% discount reductions to gain immediate margin improvements.
- Gradually evolve to dynamic, state-specific and time-sensitive discounting, powered by slicers and simulations in Power BI.

This structured, data-driven approach maximizes profitability while safeguarding competitive positioning across regions and seasons.