



HAPPY KART

# HAPPY KART LAUNCH DATA ANALYSIS

Q4 2025

Product Clustering for Inventory &  
Sales Optimization

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# Business Challenge & Opportunity

Happy Kart faces the challenge of **optimizing inventory, product assortment, and revenue** with a limited historical sales dataset and no customer-level identifiers. The opportunity lies in leveraging unsupervised analytics, specifically product clustering, to **identify high-performing products, understand demand variability, and uncover potential inventory risks**. By segmenting products based on their sales characteristics, we aim to make data-driven decisions that enhance operational efficiency and profitability, even without long-term trends or individual customer insights.



# Our Approach

## Unlocking Product Performance

### 1. Understanding the Sales Data

- Collected and meticulously cleaned transaction records.
- Ensured accurate representation of sales figures, prices, and quantities.
- Analyzed unusual sales events (outliers) as meaningful business occurrences.

### 2. Creating Product Profiles

- Aggregated transactions by product to build comprehensive profiles.
- Calculated key performance indicators: total sales, total revenue, sales frequency, average quantity per transaction.

### 3. Finding Natural Product Groups (Clustering)

- Used advanced clustering techniques to automatically identify product segments based on sales behavior.
- Grouped similar products together, revealing inherent market dynamics.

## Why This Matters for Happy Kart:

- **Identify 'Star' Products:** Pinpoint consistent sales and revenue drivers.
- **Optimize Inventory:** Better manage stock levels based on segmented demand.
- **Tailor Marketing:** Develop effective promotional strategies for specific product groups.
- **Enhance Assortment:** Make informed decisions about product promotion, introduction, or re-evaluation for smarter growth.

# Key Insight

Our analysis revealed two distinct product segments based on their sales performance:

## **Cluster 1: "High-Volume, Multi-Unit Sales Drivers"**

- Size: A smaller, but highly impactful group of 62 products.
- Characteristics: Demonstrate significantly high overall sales volume, total revenue, and sales frequency. Crucially, these products are frequently purchased in multiples within a single transaction. These are your 'star performers' that drive traffic and volume.

## **Cluster 0: "Diverse Portfolio/Slower Movers"**

- Size: Comprises the majority of products (614 items).
- Characteristics: Exhibit below-average performance across sales volume, total revenue, unique transactions, and sales frequency. They typically have a moderate unit price and are bought individually. This cluster represents essential inventory supporting product diversity and catering to various customer needs, though they are not individually high-revenue drivers.

# Strategic Implications & Recommendations

## INVENTORY

### Cluster 1: "High-Volume, Multi-Unit Sales Drivers" (62 items)

Prioritize high stock levels, implement robust demand forecasting, and optimize supply chain for continuous availability. Negotiate bulk discounts.

## MARKETING

Give prominent placement (in-store/online), offer bundled deals (e.g., "Buy 2 Get 1 Free"), incorporate into loyalty programs, and emphasize popularity.

## ASSORTMENT

Consider expanding flavors/sizes, cross-promoting with other items, and investing in quality to maintain market appeal.

### Cluster 0: "Diverse Portfolio/Slower Movers" (614 items)

Implement lean inventory practices to minimize holding costs. Maintain adequate but not excessive stock for strategic items. Explore consignment models.

Use targeted promotions (flash sales), educate customers on niche benefits, bundle with Cluster 1 items, and align with seasonal campaigns.

Regularly review performance for potential discontinuation or re-evaluation. Assess strategic value (e.g., diversity, customer loyalty). Consider repositioning or minor modifications.

## Key Limitations

- 1. Weak Inherent Clustering Structure:** High Hopkins Statistic (0.9848) suggests data does not naturally form highly distinct clusters. The algorithm imposes structure, reducing naturalness.
- 2. Limited Historical Data:** Short timeframe (since Oct 2025) restricts generalizability to long-term trends or seasonality.
- 3. Absence of Customer Identifiers:** Analysis is purely product-centric, lacking customer behavior, segmentation, or loyalty insights.

## Potential Risks in Decision-Making

- Overlooking Strategic Niche Products:** Risk of deprioritizing Cluster 0 items based solely on volume, ignoring their value for diversity or specific customer segments.
- Skewed Resource Allocation:** Over-reliance on Cluster 1 for resources, neglecting growth opportunities in Cluster 0.
- Self-Fulfilling Prophecies:** Reduced investment in 'low-performing' products (Cluster 0) can further suppress their sales.

## Enhancing Future Strategies:

- Integrate Domain Expertise:** Combine algorithmic insights with qualitative knowledge from business leaders and product managers.
- Acquire More Comprehensive Data:** Prioritize longer historical data and customer identifiers for robust future analyses.
- Continuous Monitoring:** Regularly re-evaluate clustering model and product performance to adapt to market dynamics.



# Conclusion & Next Steps

## VALUE OF INSIGHTS:

1. Strategic Segmentation: Tailored strategies for "High-Volume Drivers" and "Lower Activity Products."
2. Operational Efficiency: Improved inventory management, minimizing overstocking and stock-outs.
3. Targeted Marketing: More focused campaigns for higher ROI.
4. Foundation for Growth: Initial blueprint for data-informed retail strategy, even with limited data.

## HIGH-LEVEL NEXT STEPS FOR EXECUTIVE TEAM:

1. **Implement Differentiated Inventory Strategies:** Optimize stock for each cluster.
2. **Tailor Marketing & Promotional Efforts:** Develop targeted campaigns for each segment.
3. **Integrate Human Expertise and Qualitative Review:** Combine data with domain knowledge for balanced decisions.
4. **Prioritize Data Enhancement:** Invest in customer identifiers and longer historical data for future analyses.



HAPPY KART

# THANK YOU FOR YOUR ATTENTION

With a clear strategy, strong market insight, and a solid plan, we are ready to turn vision into reality.

