

# Customer Segmentation Project: Strategic Recommendations for Future Implementation

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**Project Title:** Identify customer segments for online retail with the use of K-means clustering.

**Date:** 25/06/2025

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## ❖ Executive Summary

This project successfully implemented customer segmentation using the Online Retail Dataset, applying TF-IDF-based product clustering, PCA for dimensionality reduction, and KMeans clustering for segment identification. This has enabled a more nuanced understanding of customer purchasing patterns.

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## ■ Key Outcomes

- Customers were segmented based on purchase behavior and product affinity.
  - Clear differentiation of customer personas emerged (e.g., frequent low-spenders vs. high-value loyal customers).
  - Product clusters revealed natural groupings that can enhance marketing and inventory strategies.
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## ⌚ Future Recommendations

### 1. Personalized Marketing Campaigns

- Implement segment-specific promotions, upsells, and email content.
- Use behavioral data to tailor offers to high CLV (Customer Lifetime Value) clusters.

### 2. Dynamic Product Bundling

- Group frequently co-purchased items within clusters.
- Offer bundle discounts to improve conversion and increase cart size.

### 3. Inventory Optimization

- Align warehouse stock levels with product cluster demand.
- Reduce overstock of low-frequency items using segment insights.

### 4. Enhanced Customer Experience

- Create cluster-specific website experiences and navigation.
- Deploy chatbots or recommendations tailored to each segment's intent.

### 5. Geo-Cluster Targeting

- Combine clusters with regional purchase data for hyperlocal campaigns.

- Focus regional efforts on clusters with the highest response rates.

## **6. Behavior Monitoring and Drift Detection**

- Retrain clustering models quarterly to adapt to new behaviors.
- Use cluster shift analysis to detect emerging trends or churn risk.

## **7. Dashboard and Business Integration**

- Embed clusters into Power BI/Tableau dashboards.
- Enable real-time drill-down of segment-wise performance.

## **8. Model Improvements**

- Explore Autoencoders or DBSCAN for deeper segmentation in future.
- Consider time-based sequence models for evolving user behavior.

## **9. Real-Time Cluster Assignment**

- Save PCA and KMeans models to assign cluster labels to new customers instantly.
- Integrate with CRM or transaction systems.

## **10. A/B Testing and Validation**

- Design A/B tests for campaigns targeting specific clusters.
  - Measure lift in KPIs such as conversion rate, CTR, and revenue per user.
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## **Next Steps**

1. Finalize cluster validation metrics and assign business-friendly names to clusters.
  2. Share clustering results with marketing and supply chain teams.
  3. Begin integration of models and dashboards with operational systems.
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## **Strategic Impact**

Effective customer segmentation will:

- Boost revenue through precise targeting.
- Enhance customer satisfaction via personalization.
- Optimize operational efficiency from stock to campaigns.

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