

TravelTide Project: Detailed Report

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Project Objective

TravelTide, a leading name in the travel industry, is planning to launch a rewards program that assigns tailored perks to enhance customer engagement and strengthen loyalty. The objective of this project was to:

- Define five actionable customer segments based on booking behavior.
- Assign tailored perks to each segment to strengthen loyalty.
- Provide a data-driven framework for targeted marketing, with a focus on retention, engagement, and long-term customer value.

Methodology

◆ Feature Selection & Engineering

To enable segmentation, user-level data was derived by aggregating session-level booking records. Each record represented one user and summarized their travel and booking behavior.

Key features:

- Travel frequency & booking type (flights, hotels)
- Discount usage (rate & amount)
- Cancellation behavior (rate and count)
- Spending per trip
- Travel party size (number of seats/rooms)
- Demographics (age, family indicators such as presence of children)

◆ Data Preparation

- **Standardization** → Numerical variables were standardized to ensure comparability across features.
- **Imputation** → Missing values were handled using tailored imputation strategies. Count-based variables were filled with zero, while financial attributes were imputed with their respective median value.
- **Outliers** are handled to avoid bias in clustering.

◆ Clustering Approach

- **PCA:** Unsupervised machine learning was used to identify inherent customer segments based on behavioral patterns. To enhance clustering performance and reduce noise, principal component analysis (PCA) was first applied to transform the feature space into a lower-dimensional representation.
- **K-Means:** K-Means clustering was then performed on the resulting principal components, chosen for its interpretability and scalability.
- **Silhouette score:** The number of clusters was set to five, in alignment with the business objective of assigning one personalized perk per segment. To validate the quality of the clustering solution, the silhouette score was computed. This metric helped assess the internal cohesion and separation of clusters, ensuring that the identified segments were both meaningful and distinct.
- Dimensionality reduction through **PCA** provided clean **2D** and **3D** visualizations, facilitating a clearer understanding of the cluster structure.

Segments and Assigned Perks

The analysis produced five customer segments, each with distinct behaviors and a custom perk:

Segment	Key Characteristics	Assigned Perk	Users	Revenue
Family & Group Travelers	High multi-seat/room bookings, frequent family/children travel	Family Comfort Package	515	\$1.36M
Occasional Voyagers	Lowest booking frequency and engagement	Welcome Flight Discount (25% first flight)	1,692	\$1.61M
Frequent Business Flyers	High booking volume, high cancellations, large discounts used	Lounge Access & Free Cancellation	585	\$1.93M
Road Warriors	Highest bookings, no cancellations	Priority Boarding & Fast Track Access	1,601	\$4.12M
Steady Explorers	Moderate, consistent bookings, frequent checked-bag use	Early-Bird Deal Alerts + 1 Free Checked Bag	1,605	\$2.92M

Segment Profiles & Business Implications

- Road Warriors and Steady Explorers drive over half of total revenue, making them top priority for loyalty initiatives, premium upgrades, and fast-track services.
- Frequent Business Flyers are a small but outsized value group, responsive to premium perks focusing on flexibility and exclusive access.
- Occasional Voyagers comprise the largest segment by volume but low revenue per user, representing untapped potential; activation strategies should focus on aggressive welcome offers and seasonal campaigns to increase conversion and engagement.
- Family & Group Travelers are a niche but strategically important group to target during off-peak demand periods through bundled offers and comfort upgrades.

Strategic Recommendations

1. **Retain High-Value Segments:** Focus on Road Warriors and Frequent Business Flyers with targeted loyalty programs, ensuring maximum retention and upsell opportunities.
2. **Activate Large/Low Engagement Groups:** Use bold incentives to convert Occasional Voyagers into higher-value customers, leveraging their volume.
3. **Engage Niche Segments:** Fill off-peak demand using family/group comfort perks and cross-selling multi-seat/room deals.
4. **Data-Driven Optimization:** Continually assess strategies using segment-specific KPIs like CLV, rebooking, and conversion rates; apply A/B testing and iterate based on real data.
5. **Perk Validation:** Future efforts should include direct customer feedback and responsiveness testing for perk assignments to maximize long-term effectiveness.

Conclusion

TravelTide's segmented approach provides a robust, data-driven foundation for aligning marketing actions with customer needs, driving both loyalty and sustainable revenue growth. Prioritizing high-value clusters and refining offers through feedback and iteration will enable superior customer experiences and business outcomes. The methodology and findings support ongoing innovation, ensuring TravelTide remains competitive and responsive in the travel market.