End-to-End Customer Intelligence & Analytics Platform

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Tools: Python, SQL, Power BI

1.Project Overview

The End-to-End Customer Intelligence & Analytics Platform is designed to provide a unified, analytics-driven view of customer behavior, engagement, churn risk, and revenue contribution. The platform integrates data engineering, analytical modeling, and visualization to support both strategic decision-making and operational customer management.

The core objective of the project is to move beyond static reporting and enable actionable intelligence. By combining customer segmentation, engagement trends, and churn-risk indicators, the platform helps organizations identify which customer groups matter most, where revenue is most exposed, and how retention resources should be prioritized.

This solution mirrors real-world analytics systems used in product, marketing, and customer success teams, demonstrating how data science and business intelligence can jointly inform revenue protection and growth strategies.

2. Business Problem Statement

Organizations often struggle to answer fundamental customer analytics questions such as:

- Which customer segments generate the most revenue?
- Which customers are at risk of churn, and how severe is that risk?
- Are engagement levels improving or declining over time?
- Where should retention efforts be focused to maximize ROI?

Without a consolidated analytics platform, these questions are addressed using disconnected reports or intuition-driven decisions. This leads to inefficient allocation of retention budgets and missed opportunities to intervene before customer churn occurs.

This project addresses these challenges by building an analytics framework that connects customer engagement behavior directly to churn risk and revenue impact, enabling data-backed prioritization instead of reactive decision-making.

3. Data Sources & Preparation

3.1 Data Sources

The analysis uses multiple structured datasets representing customer interactions and transactions. These include:

- Customer Features Dataset:
  Contains customer-level attributes such as engagement events, recency metrics, churn risk indicators, and derived customer segments (High-Value Active, Discount-Driven, At-Risk/Dormant).
- Fact Transactions Dataset:
  Includes transactional details such as order counts, revenue amounts, payment methods, timestamps, and promotional usage.

- Engagement & Cohort Outputs:
  Generated from analytical processing to support monthly engagement tracking and activity consistency analysis.

Together, these datasets enable multi-level analysis across customers, segments, and time periods.

3.2 Data Cleaning & Feature Engineering

Data preparation was performed using Python (Pandas and NumPy). The following steps ensured data readiness for analysis:

- Standardized customer identifiers across datasets to enable reliable joins
- Converted date fields into analytical formats for time-series analysis
- Aggregated transactional data to compute revenue, order volume, and activity frequency
- Engineered churn-related indicators such as:
  - At-risk flags
  - Recency in days since last activity
  - Engagement frequency metrics
- Validated aggregated outputs to ensure alignment with business logic

The processed datasets were exported and loaded into Power BI, where analytical relationships and measures were established for interactive reporting.

4. Analytics & Modeling Approach

Customer segmentation was a central component of the analysis. Customers were classified into segments based on engagement patterns, revenue contribution, and churn indicators:

High-Value Active: Customers with strong engagement and high revenue contribution

Discount-Driven: Customers generating revenue but exhibiting higher churn sensitivity

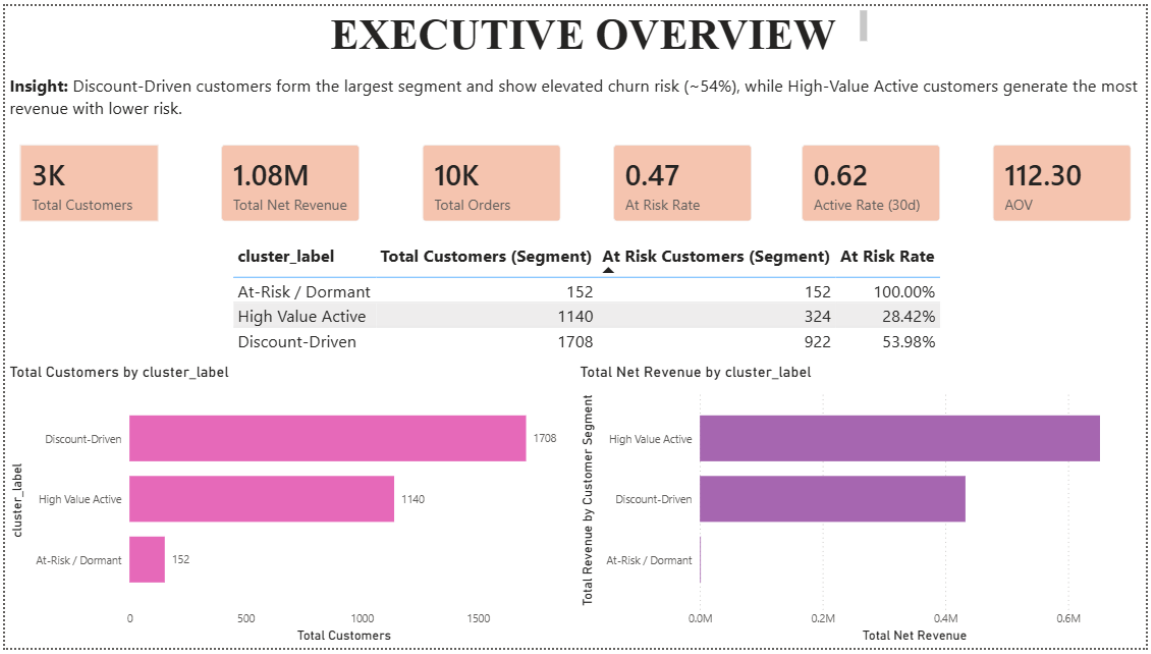
At-Risk / Dormant: Customers with minimal engagement and high churn risk

Key performance indicators (KPIs) such as total customers, revenue, orders, at-risk rate, active rate (30 days), and average order value were computed to provide a consistent measurement framework across all analyses.

5. Power BI Dashboard & Visual Analysis

5.1 Executive Overview (Power BI Page 1)

Purpose:
To provide leadership with a high-level snapshot of customer health, revenue distribution, and churn exposure.



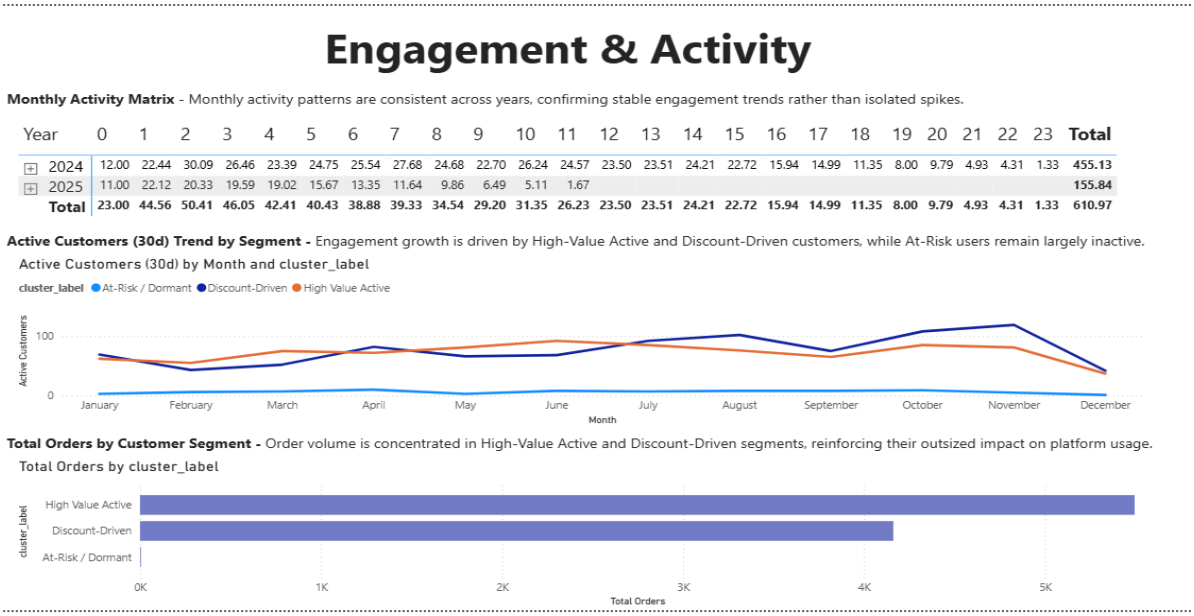
Explanation:
This page consolidates the most critical KPIs into a single executive view. The KPI cards summarize overall platform performance, while the segment-level table and bar charts break down customer count, churn risk, and revenue contribution by segment.

The visuals clearly show that Discount-Driven customers represent the largest segment and exhibit elevated churn risk, while High-Value Active customers contribute the majority of revenue with significantly lower risk. This immediately highlights where leadership attention is required.

This page is designed to answer the question:
"What is happening overall, and where should we focus first?"

5.2 Engagement & Activity (Power BI Page 2)

Purpose:
To analyze customer engagement trends over time and identify which segments drive platform activity.



Explanation:
The monthly activity matrix demonstrates that engagement patterns remain relatively consistent across years, indicating stable usage behavior rather than isolated spikes. This provides confidence in the reliability of observed trends.

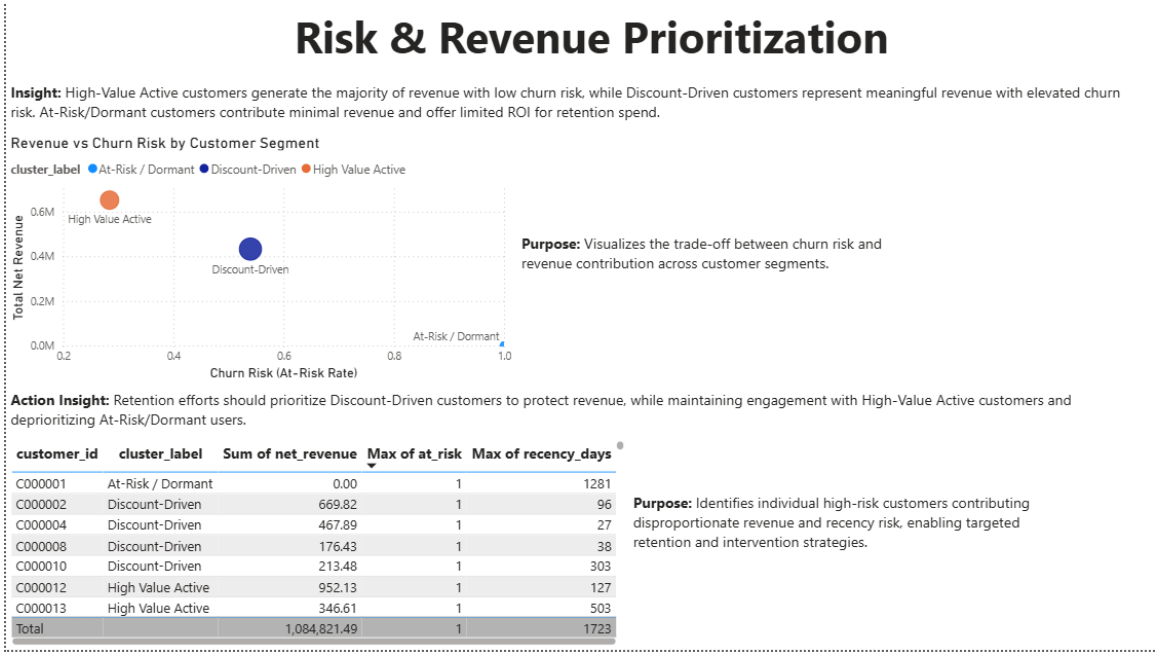
The Active Customers (30d) trend by segment reveals that engagement growth is primarily driven by High-Value Active and Discount-Driven customers, while At-Risk/Dormant users remain largely inactive. This separation helps distinguish healthy growth from latent churn risk.

The Total Orders by Segment visual reinforces this insight by showing that order volume is heavily concentrated among the same two segments, confirming their outsized influence on platform usage.

This page answers the question:
"Who is actively engaging with the platform, and how is that changing over time?"

5.3 Risk & Revenue Prioritization (Power BI Page 3)

Purpose:
To evaluate the trade-off between churn risk and revenue impact and support targeted retention decisions.



Explanation:
The scatter plot visualizes each customer segment based on churn risk (x-axis) and total net revenue (y-axis). This makes the risk–reward trade-off immediately visible:

- High-Value Active customers appear in the low-risk, high-revenue quadrant
- Discount-Driven customers show moderate revenue with elevated churn risk
- At-Risk/Dormant customers contribute minimal revenue while carrying extreme churn risk

The customer-level action table complements this strategic view by identifying individual customers with high churn risk and meaningful revenue exposure. Metrics such as net revenue and recency help prioritize which customers should receive immediate intervention.

This page answers the question:
"Which customers and segments should we act on first to protect revenue?"

6. Key Insights & Business Impact

- Revenue is highly concentrated in a small subset of engaged customers
- Churn risk is not evenly distributed across customer segments
- Discount-Driven customers represent the largest revenue protection opportunity
- At-Risk/Dormant customers offer limited ROI for retention investment

By aligning churn risk with revenue impact, the platform enables smarter, data-driven retention strategies rather than blanket engagement efforts.

7. Conclusion

This project demonstrates how an end-to-end analytics platform can transform raw customer data into meaningful business intelligence. By integrating data preparation, analytical modeling, and interactive visualization, the solution supports both executive decision-making and operational action.

The platform provides a scalable foundation that can be extended with predictive modeling, real-time monitoring, and automated alerting, making it suitable for real-world enterprise deployment.