

# Project Title: Telecom Customer Churn Analysis

## Milestone 2 – Engagement Analysis & Statistical Testing

### Objective:

To analyze customer engagement patterns, evaluate revenue impact, and statistically validate key churn drivers using hypothesis testing and correlation analysis.

### Key Focus Areas:

- Customer Lifetime Value (CLV) analysis
- Engagement and stickiness metrics
- Hypothesis testing of churn drivers
- Churn journey and critical tenure periods
- Feature correlation insights
- Customer persona development and retention strategies

### Tools Used:

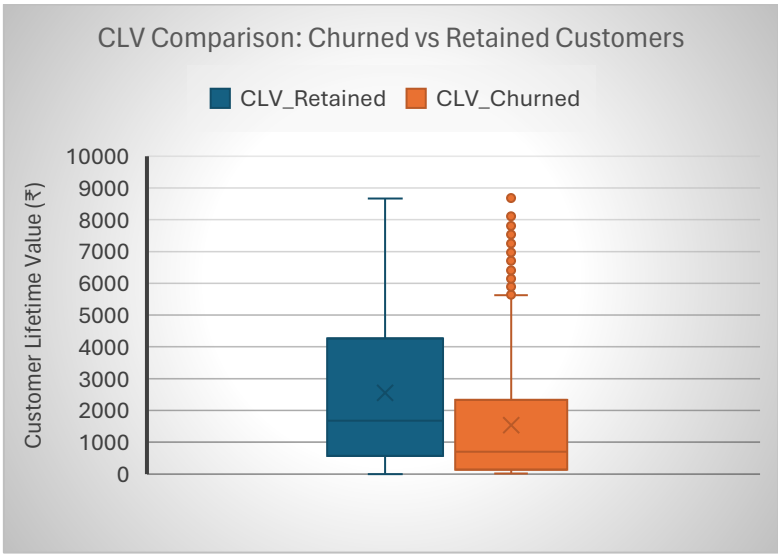
Microsoft Excel (Pivot Tables, Statistical Tests, Visualizations)

### Prepared By:

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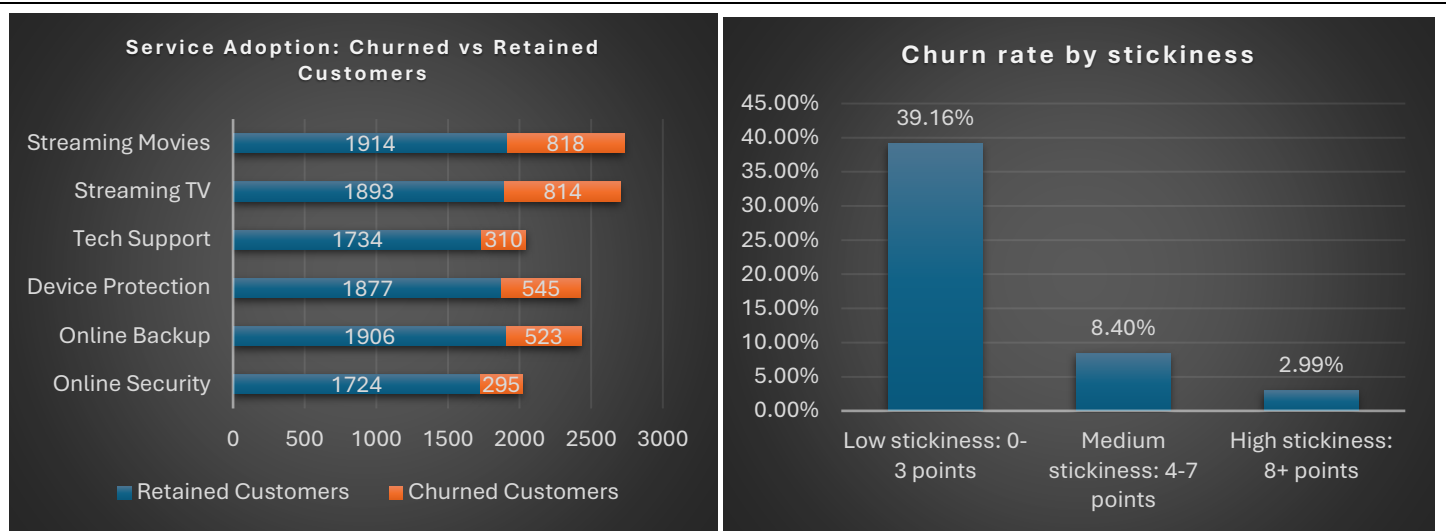
## 1. CLV Analysis & Revenue Impact

Customer Lifetime Value (CLV) analysis highlights the significant revenue impact of customer churn. Retained customers generate substantially higher lifetime value compared to churned customers. The **average historical CLV** of retained customers is ₹2,555, while churned customers generate only ₹1,532, indicating a direct revenue loss when customers exit early. Predicted CLV further reinforces this gap, with retained customers expected to contribute ₹1,383 on average versus ₹1,037 for churned customers. Contract-level analysis shows that **longer contracts drive higher value**. Month-to-month customers have the lowest CLV (₹1,164 for churned), whereas two-year contract customers generate the highest CLV (₹5,432 for churned and ₹3,679 for retained). This confirms that **contract commitment strongly improves revenue stability**. The **CLV box plot** visually supports these findings, showing a higher median and wider CLV distribution for retained customers, while churned customers are concentrated at lower CLV levels. Overall, churn disproportionately affects high-value customers, making retention a critical lever for revenue growth.



## 2. Engagement Metrics and Stickiness Findings

Customer engagement was analysed using **Average Revenue Per User (ARPU)**, **service count**, and a **stickiness score** derived from contract type, payment mode, and add-on services. ARPU analysis shows that **churned customers have a higher average monthly charge (₹74.43)** compared to retained customers (₹61.18). This indicates that **higher prices alone do not guarantee retention** and may contribute to churn when not supported by sufficient perceived value. Service bundle engagement reveals that retained customers have a **slightly higher average service count (4.17)** than churned customers (4.07). Although the difference is modest and statistically insignificant (ANOVA p-value = 0.104), it suggests that customers with broader service adoption tend to remain longer. Stickiness analysis further strengthens this insight. Customers with **longer contracts, automatic payment methods, and support/security add-ons** demonstrate lower churn rates. In contrast, customers with **low stickiness scores**—typically on month-to-month contracts, manual payments, and limited add-on services—exhibit higher churn. Overall, engagement quality, driven by **contract commitment and value-added services**, plays a more critical role in retention than pricing alone.



### 3.Hypothesis Testing Summary and Business Interpretation

#### Test 1: Monthly Charges vs. Churn (Two-sample t-test)

The test shows a statistically significant difference in monthly charges between churned and retained customers ( $p < 0.001$ ). Churned customers pay higher monthly charges, indicating strong price sensitivity and a perceived value gap.

#### Test 2: Contract Type vs. Churn (Chi-square test)

Results confirm that churn is significantly dependent on contract type ( $p < 0.001$ ). Month-to-month customers churn more, while long-term contracts improve customer stability and retention.

#### Test 3: Payment Method vs. Churn (Chi-square test)

The test shows a significant relationship between payment method and churn ( $p < 0.001$ ). Customers using manual payment methods, especially electronic checks, exhibit higher churn, highlighting the importance of payment convenience.

#### Test 4: Service Count vs. Churn (ANOVA)

The ANOVA test is not statistically significant ( $p = 0.104$ ). This indicates that the number of services alone does not influence churn, service type and engagement quality matter more than quantity.

#### Overall Business Conclusion

The hypothesis tests confirm that **pricing pressure, contract flexibility, and payment experience** are the strongest churn drivers, while service count by itself has limited impact. These findings support **targeted retention strategies**, such as price optimization, contract upgrades, and promotion of automatic payment methods.

### 4.Churn Journey & Critical Periods Identified

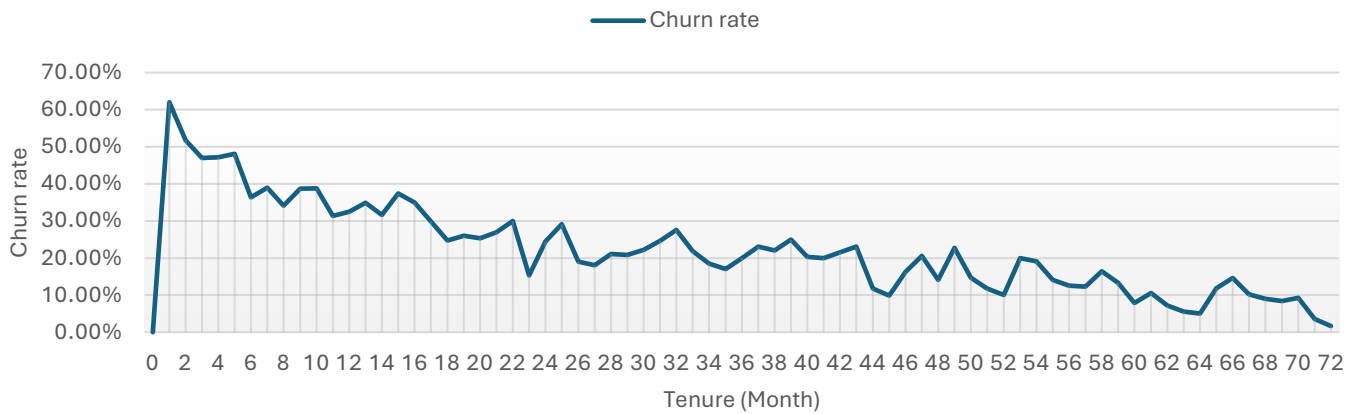
**Analysis of churn rate by tenure (0–72 months) reveals a clear churn journey pattern.**

- **Early Tenure (1–6 months): High Risk**  
Churn peaks in the first few months, with rates exceeding 45–60%, indicating weak onboarding, unmet expectations, and early price sensitivity.
- **Stabilization Phase (7–24 months): Moderate Risk**  
Churn steadily declines to the 25–35% range, suggesting that customers who remain beyond six months begin to perceive value and stabilize.
- **Long Tenure (25+ months): Low Risk**  
Churn drops consistently below 15%, reaching under 5% after 60 months, reflecting strong loyalty and high switching costs.
- **Contract Renewal Influence**  
Small churn spikes around 12 and 24 months indicate contract renewal decision points.

#### Key Insight:

The first six months represent the most critical churn window. Improving onboarding, pricing communication, and early engagement during this period can significantly reduce overall churn and improve long-term retention.

Churn Journey: Churn Rate by Tenure Month



## 5.Feature Correlation Insights

Correlation analysis reveals that **tenure** and **customer stickiness** are the strongest factors influencing churn. Tenure shows a **moderate negative correlation (-0.35)** with churn, indicating that customers become significantly less likely to leave as their relationship with the company matures. Similarly, the **Stickiness Score (-0.38)** demonstrates that long-term contracts, automatic payments, and add-on services meaningfully reduce churn by increasing engagement and switching costs.

**Monthly charges** display a **weak positive correlation (+0.19)** with churn, suggesting moderate price sensitivity where higher prices slightly increase the likelihood of churn. **Total charges** have a **weak-to-moderate negative correlation (-0.20)**, indicating that customers with higher lifetime spend tend to remain loyal. In contrast, **service count** shows a **very weak correlation (-0.02)**, confirming that the number of services alone does not strongly influence churn unless combined with engagement-driven features.

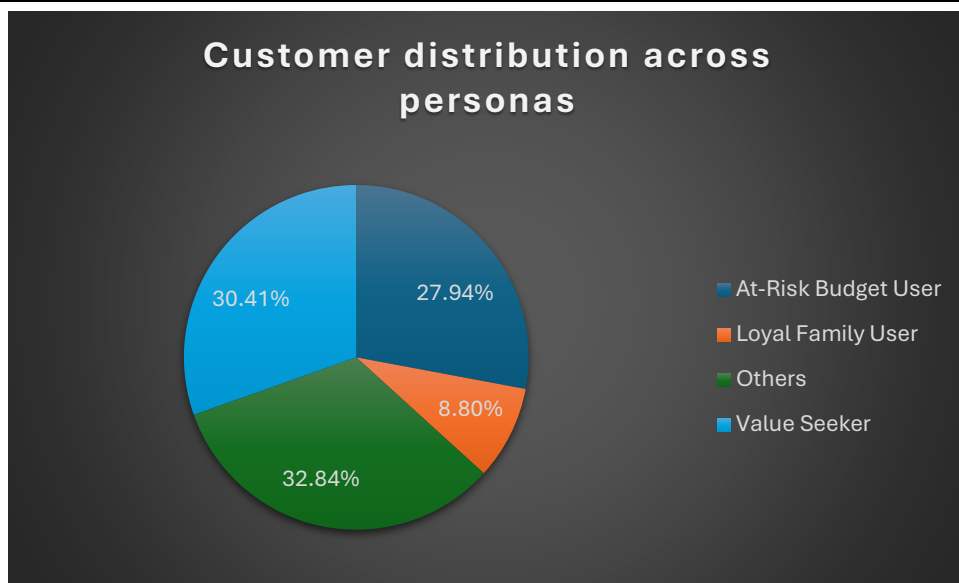
Overall, the analysis highlights that **engagement quality and customer tenure matter more than service quantity**, reinforcing the need for retention strategies focused on long-term commitment and value perception rather than simple service bundling.

## 6. Customer Personas Developed

Based on engagement behaviour, pricing sensitivity, and churn patterns, customers were segmented into four key personas. The largest segment is **Value Seekers (30.41%)**, who actively use services but remain price-conscious, indicating opportunities for value-based retention offers. **At-Risk Budget Users (27.94%)** form a significant portion of the base and show high churn risk due to short tenure, month-to-month contracts, and manual payments, requiring immediate retention focus.

**Loyal Family Users (8.80%)** represent a smaller but highly valuable segment, characterized by long tenure, bundled services, automatic payments, and low churn risk. The **Others (32.84%)** category includes mixed behaviour customers who do not strongly align with a single profile but may shift into higher-risk or loyal segments based on engagement initiatives.

This segmentation enables **targeted, persona-driven retention strategies** rather than a one-size-fits-all approach.



## 7. Retention Strategy Implications

The analysis indicates that churn is driven primarily by **price sensitivity, contract flexibility, payment convenience, and engagement depth**. Retention strategies should therefore be **segment-specific rather than uniform**.

For **At-Risk Budget Users**, early-tenure interventions such as onboarding support, entry-level discounts, and incentives to shift from month-to-month to longer contracts can significantly reduce churn. Promoting **automatic payment methods** can further lower friction for this group.

**Value Seekers** respond best to **value reinforcement strategies**, including bundled service offers, loyalty rewards, and targeted add-on promotions that improve perceived value without aggressive price reductions.

**Loyal Family Users**, although low risk, should be protected through **loyalty programs, long-term contract benefits, and exclusive service upgrades** to sustain high lifetime value and prevent late-stage churn.

For the **Others** segment, personalized engagement campaigns based on tenure and usage patterns can help transition customers into higher-value, lower-risk personas.

Overall, focusing on **early engagement, contract upgrades, payment automation, and value-based bundling** is likely to deliver the greatest impact on churn reduction and long-term revenue growth.