

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:

Tushar Pillay

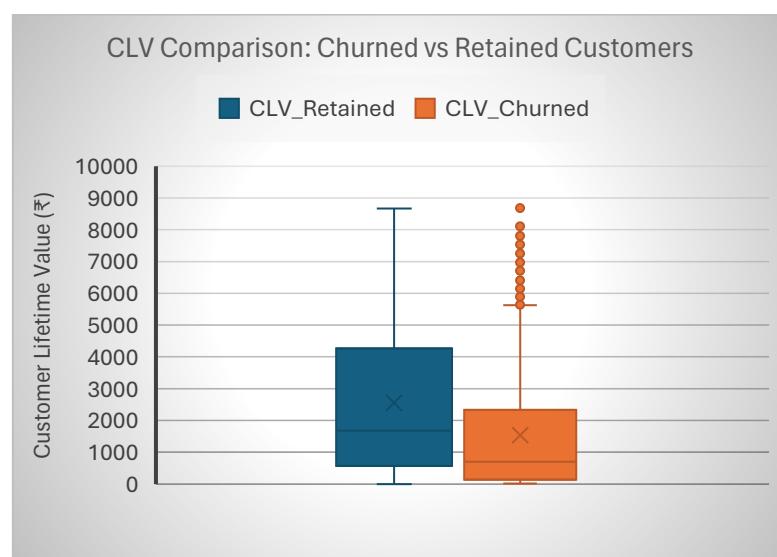
1. CLV Analysis & Revenue Impact

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

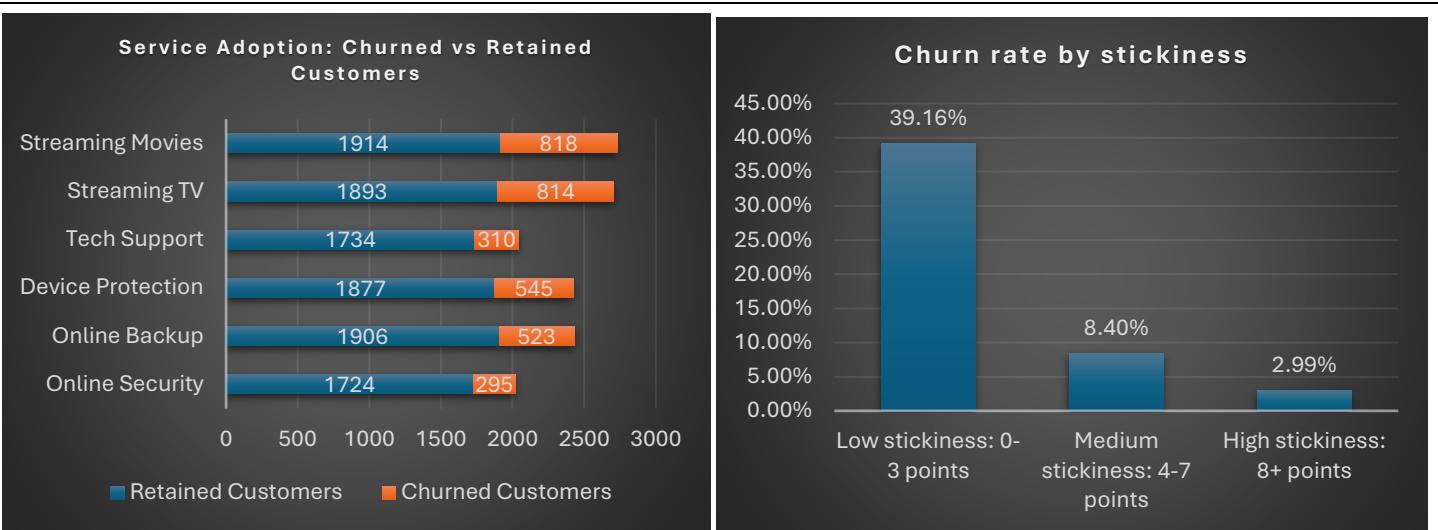
Customer engagement was analysed using **Average Revenue Per User (ARPU)**, **service count**, and a **stickiness score** derived from contract type, payment mode, and add-on services.

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

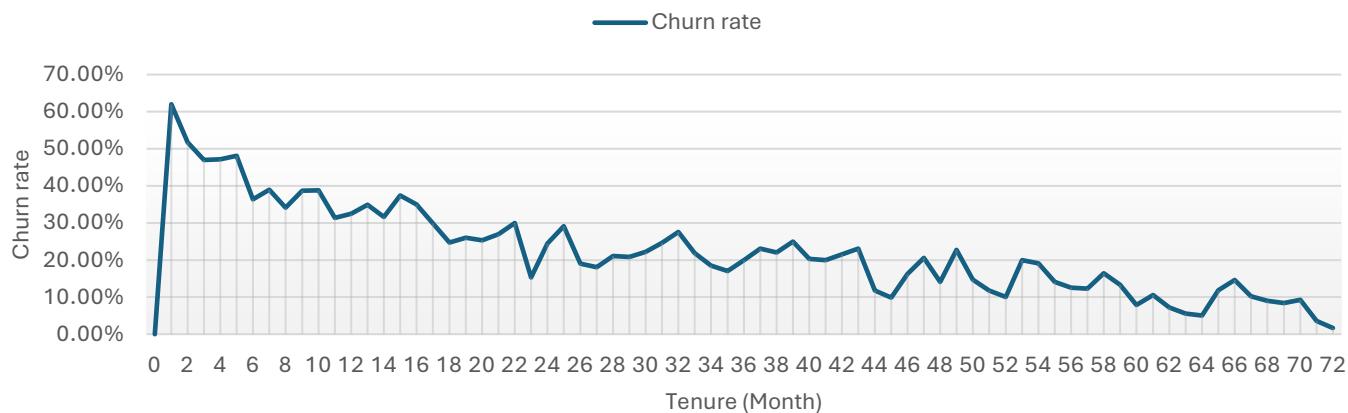
Analysis of churn rate by tenure (0–72 months) reveals a clear churn journey pattern.

- 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.

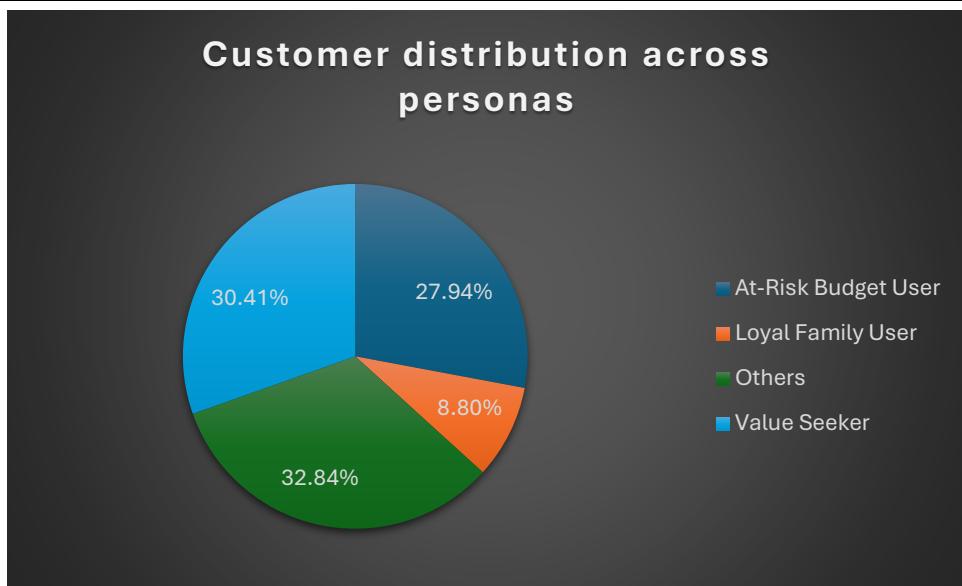
Overall, the analysis highlights that **engagement quality and customer tenure matter more than service quantity**, reinforcing the need for retention strategies focused on long-term commitment and value perception rather than simple service bundling.

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.