

# **EXECUTIVE SUMMARY REPORT**

## **(CUSTOMER CHURN ANALYSIS CASE STUDY)**

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### **1. Project Overview**

This project focuses on analyzing customer churn for a telecommunications service provider using the Telco Customer Churn dataset. The objective is to understand the characteristics and behaviours of customers who churn, identify key churn drivers, build a predictive churn model, and provide actionable recommendations to reduce attrition and improve customer lifetime value.

In this business context, churn is defined as a customer who has discontinued their subscription (Churn = Yes). Reducing churn is strategically important because customer acquisition is more expensive than retention, and subscription-based revenue depends heavily on recurring engagement and long-term customer loyalty.

## 2. Dataset Description & Data Preparation

The dataset contains **7,043 customer records** covering:

- Demographics
- Account tenure
- Internet & phone service subscriptions
- Contract and billing arrangements
- Monthly & lifetime charges
- Churn status (target variable)

Initial inspection revealed minimal missing data, limited to the TotalCharges field among customers with zero tenure. These represent new customers and the values were logically replaced with zero to preserve billing accuracy.

A binary churn flag (Churn\_flag) was created to support machine-learning modelling. No duplicate records or structural anomalies were identified, confirming that the dataset was suitable for analysis.

## 3. Churn Distribution Summary

Churn distribution across customers was:

- **Retained customers:** ~73%
- **Churned customers:** ~27%

This represents a significant churn proportion and indicates:

- revenue leakage risk
- high competition in service market
- opportunity for retention-focused strategy

The churn level justifies investment in predictive analytics and customer lifecycle management.

## 4. Exploratory Data Analysis – Key Insights

Exploratory Data Analysis was conducted to compare churn vs non-churn groups across contract type, tenure duration, internet plan type, payment method, and service engagement.

### 4.1 Contract Type & Churn

Churn rates varied strongly by contract:

- Month-to-Month customers → **highest churn (~40%+)**
- One-Year contracts → moderate churn
- Two-Year contracts → **lowest churn (~2–5%)**

### **Insight:**

Short-term contracts encourage switching behaviour, while contractual commitment significantly improves retention stability.

## **4.2 Customer Tenure & Lifecycle Risk**

Churn is highest in early-stage customers:

- First 12 months → highest churn probability
- Churn decreases steadily as tenure increases

### **Interpretation:**

The first year of service is the **critical risk window**, indicating the need for structured onboarding and customer engagement support.

## **4.3 Internet Service Type & Churn**

Fiber-optic customers recorded higher churn compared to DSL or non-internet users.

Likely drivers include:

- higher price sensitivity
- greater performance expectations
- service quality perception

### **Insight:**

This segment requires **experience-focused retention initiatives**, not purely pricing incentives.

## **4.4 Payment Method & Billing Behaviour**

Electronic check users exhibited the highest churn level, while customers on:

- automatic bank transfer
- credit-card autopay

had significantly lower churn.

### **Interpretation:**

Automatic payment methods correlate with **higher customer stability and retention**.

## **5. Feature Engineering & Modelling Approach**

Behavioural features were engineered to enhance modelling, including:

- Tenure group segmentation
- Number of subscribed services
- Value-added service adoption
- Customer lifecycle classification

Two predictive models were trained:

- Logistic Regression
- Random Forest Classifier

Models were evaluated using:

- Accuracy
- Precision & Recall
- Confusion Matrix
- ROC-AUC Score

Although Logistic Regression achieved slightly higher overall accuracy, the Random Forest model achieved higher recall on churners meaning it detected more at-risk customers.

Because missing a chunner poses greater financial risk than generating false alerts, **Random Forest was selected as the preferred model.**

## **6. Model Evaluation & Performance Summary**

Key findings:

- Random Forest achieved strong ROC-AUC performance
- It identified high-risk churn segments accurately
- It produced better balance between precision and recall

From a business perspective, the model is suitable for:

- churn risk scoring
- retention intervention targeting
- lifecycle-based customer prioritisation

## **7. Post-Predictive Churn Insight & Customer Segmentation**

Segment-level post-analysis showed strong predictive alignment for:

- month-to-month subscribers
- low-tenure customers

- fiber-optic users
- customers with higher monthly charges

Mid-tenure contract customers who eventually churned were harder to detect, suggesting potential behavioural or contextual churn triggers not present in the dataset (e.g., complaints, regional service reliability, competitor influence).

## **8. Business Impact & Recommended Retention Strategies**

Based on insights, the following strategies are recommended:

### **Priority Action Areas**

#### **1. Month-to-Month Contract Retention Programs**

- Offer tiered loyalty upgrade incentives
- Transition customers to one-year plans

#### **2. First-Year Customer Success & Onboarding**

- Structured engagement milestones
- Support touchpoints at 1, 3, 6 & 12 months

#### **3. Fiber-Optic Customer Experience Enhancement**

- Network quality monitoring
- Premium care support options
- Value-adding service bundles

#### **4. Migration to Automatic Payment Methods**

- Incentive-based autopay enrolment
- Reduce churn associated with manual billing

#### **5. Promote Value-Added Services**

- Tech support & security plan bundling
- Increased service dependency → higher retention

## **9. Strategic Implementation Considerations**

To maximize impact, the churn model should be integrated into:

- CRM systems
- retention call workflows
- marketing automation pipelines

Recommended deployment approach:

- assign churn probability scores
- classify customers into risk tiers
- trigger targeted retention campaigns

Performance should be monitored through:

- churn reduction KPIs
- cohort-based retention trends
- campaign lift evaluation

## **10. Conclusion & Future Improvement Opportunities**

The churn analysis demonstrates that attrition is strongly influenced by:

- contract flexibility
- early lifecycle engagement
- payment method type
- internet plan category
- perceived service value

The predictive churn model provides a reliable foundation for proactive customer retention and targeted intervention planning.

Future enhancement opportunities include incorporating:

- customer support interactions
- service outage & network experience data
- geographic churn segmentation
- behavioural usage metrics

These additions would further improve **churn prediction precision and strategic decision-making capability**.