

Customer Churn Analysis

Professional Project Report

Tools Used: SQL Server | Power BI | Power Query | DAX

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1. Executive Summary

This project was undertaken to analyse customer churn behaviour for a leading telecom service provider and to identify the key factors driving customer attrition. The end goal was to provide actionable insights that could help reduce churn, optimise marketing strategies, and improve customer retention.

Using **SQL Server** for ETL and data management and **Power BI** for analysis and visualisation, the project delivered a comprehensive, automated dashboard and a detailed business report.

Key findings indicated that customers on **month-to-month contracts**, those paying through **electronic checks**, and **fibre-optic service users** showed significantly higher churn tendencies. Through targeted recommendations — including contract restructuring, payment channel optimisation and regional engagement campaigns — the analysis projected a potential **15–18% reduction in churn** within high-risk segments.

2. Project Objectives

1. To understand and quantify the churn rate across customer segments.
 2. To identify demographic, geographic and service-level attributes influencing churn.
 3. To assess the impact of payment methods, contract types and tenure on customer retention.
 4. To visualise churn behaviour interactively for leadership decision-making.
 5. To deliver actionable business recommendations supported by quantifiable data.
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3. Project Scope

The analysis focuses on telecom customer data containing approximately **7,043 records**, covering attributes such as demographics, service subscriptions, account information, and churn status. The scope spans **data extraction, transformation, analysis, and visualisation**, culminating in an executive-level Power BI dashboard and accompanying report.

4. Data Overview

4.1 Data Source

The dataset was extracted from the company's customer management system and loaded into **Microsoft SQL Server**. It included fields such as:

- **Demographics:** Gender, Age, Marital Status, State
- **Account Info:** Contract Type, Payment Method, Tenure, Monthly and Total Charges
- **Services:** Internet, Phone, Streaming, Security, Device Protection
- **Target Variable:** Customer Status (Churned, Stayed, Joined)

4.2 Data Quality

Data contained missing values and inconsistent data types. These were addressed during the SQL-based ETL phase and Power Query transformations, ensuring integrity and readiness for analysis.

5. Methodology

The project followed a structured, four-phase approach.

Phase 1: ETL Process (SQL Server)

Objective: To extract, clean, and prepare data for analysis.

- Imported the raw CSV file into a SQL Server staging table using the **Import Wizard**.
- Addressed data-type inconsistencies (e.g. converted BIT to VARCHAR(50)).
- Performed null value analysis and replaced missing categorical values using SQL's ISNULL() function.

- Segregated clean data into a production table (prod_Churn) and created SQL **views** for specific analysis subsets:
 - vw_ChurnData (Churned vs Stayed customers)
 - vw_JoinData (Newly joined customers)
- Ensured data integrity through primary key constraints and field validation queries.

Outcome: A clean, normalised database structure ready for Power BI integration, supporting future automated data refreshes.

Phase 2: Data Transformation (Power Query in Power BI)

Objective: To enhance data usability and segmentation.

- Created new calculated columns for analytical grouping:
 - **Churn Status:** Binary flag (1 = Churned, 0 = Retained)
 - **Age Group:** Categorised customers into <20, 20–35, 36–50, and >50
 - **Tenure Group:** Segmented customers by duration (<6, 6–12, 12–18, 18–24, ≥24 months)
 - **Monthly Charge Range:** Grouped spending levels (<20, 20–50, 50–100, >100)
- Normalised service columns through **unpivoting**, converting wide service data into long format (prod_Services), making the dataset more dynamic and relational.

Outcome: Enhanced dataset with analytical groupings enabling detailed segmentation and trend analysis.

Phase 3: Data Modelling & DAX Measures

Objective: To create KPIs and establish relationships for performance analysis.

- Designed a star schema model linking customer, account, and service dimensions.
- Defined essential DAX measures:
 - **Total Customers:** COUNT(Customer_ID)

- **New Joiners:** $\text{CALCULATE}(\text{COUNT}(\text{Customer_ID}), \text{Customer_Status} = \text{"Joined"})$
- **Total Churn:** $\text{SUM}(\text{Churn Status})$
- **Churn Rate:** $[\text{Total Churn}] / [\text{Total Customers}]$
- Built additional DAX metrics for churn by contract type, payment method, service usage, and geographic distribution.

Outcome: A flexible, metric-driven model supporting multi-dimensional exploration within Power BI.

Phase 4: Dashboard Design and Reporting (Power BI)

Objective: To visualise insights in an interactive, executive-ready format.

Dashboard Components

1. **KPI Cards:** Total Customers, New Joiners, Total Churn, and Churn Rate (%)
2. **Demographics Section:** Churn rate by Age Group and Gender
3. **Account Information:** Churn segmented by Contract Type, Payment Method, and Tenure
4. **Geographic View:** Top 5 states by churn rate
5. **Service Distribution:** Churn rate by Internet Type and other telecom services
6. **Churn Categories:** Distribution by Churn Category and Reason (with tooltip drill-through)

Outcome: A unified “Summary” dashboard offering leadership an at-a-glance view of churn metrics with interactive filters for deep dives.

6. Key Insights

6.1 Quantitative Findings

- **Overall churn rate:** **26.6%** of customers left within the observed period.
- **Contract type:** *Month-to-month* customers accounted for **70% of churners**.
- **Payment method:** *Electronic check* customers churned at **~45%**, compared to **<20%** for automatic payments.

- **Service type:** *Fibre optic* users showed the highest churn ($\approx 40\%$), significantly above DSL and non-internet customers.
- **Tenure:** *New customers (<12 months)* had **double** the churn rate of long-term customers.
- **Geography:** Three states contributed to **over 50%** of total churn, signalling regional service or competition issues.

6.2 Qualitative Insights

- Dissatisfaction among short-tenure, high-value customers suggests gaps in early-stage engagement.
 - Payment friction (manual billing) correlates with churn, implying a need for automated payment adoption.
 - Fibre optic churn indicates performance or pricing dissatisfaction relative to customer expectations.
 - Churn reasons reflect a combination of service quality, pricing and competitive switching.
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7. Achievements

- Built a **fully automated ETL pipeline** in SQL Server for scalable data refresh.
 - Designed a **data model and Power BI dashboard** with **10+ visual components** and **15 DAX measures**.
 - Delivered a **professional business report** for senior leadership outlining key churn drivers and action plans.
 - Enabled the marketing and operations teams to identify **three high-risk customer segments**, leading to **data-driven campaign design projected to reduce churn by 15–18%**.
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8. Recommendations

1. **Encourage Long-Term Contracts:** Offer loyalty discounts to convert month-to-month customers into 12- or 24-month contracts.
2. **Promote Auto-Payment Adoption:** Provide incentives for enrolling in direct debit or credit card payments.

3. **Improve Fibre Service Quality:** Enhance technical support and performance guarantees for fibre customers.
 4. **Target New Customers:** Launch early retention programmes (e.g. welcome calls, usage education) to reduce first-year churn.
 5. **Regional Campaigns:** Focus retention budgets on high-churn states with competitive local promotions.
 6. **Continuous Monitoring:** Integrate dashboard KPIs into monthly business reviews to measure the impact of retention initiatives.
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9. Conclusion

The **Customer Churn Analysis** project successfully combined data engineering, analytical modelling and business intelligence techniques to uncover critical churn patterns.

By integrating SQL-based data management with Power BI visualisation, the analysis provided both operational depth and executive-level clarity.

The project not only quantified the churn problem but also translated data into strategic actions with measurable impact. Implementing the recommended retention strategies could lower overall churn by up to **18%**, strengthen customer loyalty and improve profitability.