

# Telco Customer Churn Analysis

This project provides an in-depth analysis of customer churn in the telecommunications industry. The analysis focuses on understanding the demographics and account information of high-risk customers to identify factors contributing to churn. This project is intended to help businesses make data-driven decisions to improve customer retention.

## Project Overview:

The goal of this analysis is to:

- Analyze customer churn data to understand key factors associated with churn.
- Visualize churn rates by demographic and account features.
- Provide insights and recommendations to reduce churn.

## About the Dataset:

The [dataset](#) used for this project is publicly available and contains information on customers, including:

- Demographics: Gender, senior citizen status, partner status, and dependents.
- Account Information: Contract type, payment method, and monthly charges.
- Services: Internet service, online security, device protection, and more.

## Columns Description:

1. **customerID**: A unique identifier for each customer.
2. **gender**: The gender of the customer (Male or Female).
3. **SeniorCitizen**: Indicates whether the customer is a senior citizen (1 = Yes, 0 = No).
4. **Partner**: Indicates whether the customer has a partner (Yes or No).
5. **Dependents**: Indicates whether the customer has dependents (Yes or No).
6. **tenure**: The number of months the customer has stayed with the company.
7. **PhoneService**: Indicates whether the customer has a phone service (Yes or No).
8. **MultipleLines**: Indicates whether the customer has multiple phone lines (Yes, No, or No phone service).
9. **InternetService**: The type of internet service the customer has (DSL, Fiber optic, or No internet service).
10. **OnlineSecurity**: Indicates whether the customer has online security service (Yes, No, or No internet service).
11. **OnlineBackup**: Indicates whether the customer has an online backup service (Yes, No, or No internet service).
12. **DeviceProtection**: Indicates whether the customer has a device protection service (Yes, No, or No internet service).
13. **TechSupport**: Indicates whether the customer has tech support service (Yes, No, or No internet service).
14. **StreamingTV**: Indicates whether the customer has a streaming TV service (Yes, No, or No internet service).
15. **StreamingMovies**: Indicates whether the customer has streaming movies service (Yes, No, or No internet service).
16. **Contract**: The type of contract the customer has (Month-to-month, One year, Two years).
17. **PaperlessBilling**: Indicates whether the customer uses paperless billing (Yes or No).
18. **PaymentMethod**: The payment method used by the customer (Bank transfer, Credit card, electronic check, Mailed check).
19. **MonthlyCharges**: The monthly charges paid by the customer.
20. **TotalCharges**: The total charges paid by the customer to date.
21. **Churn**: Indicates whether the customer has churned (left the company) (Yes or No).

## EDA Questions:

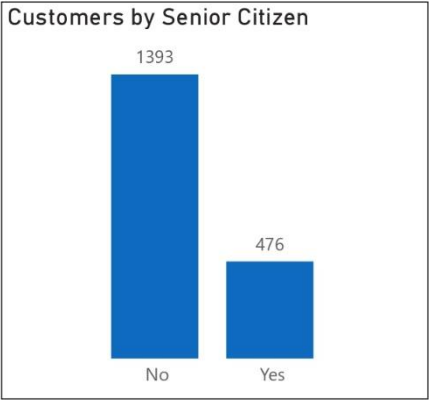
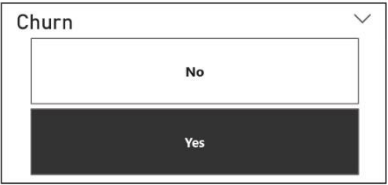
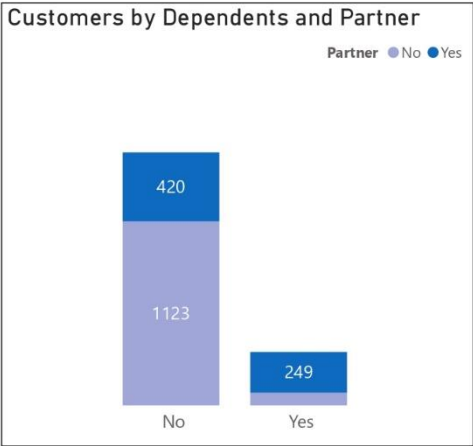
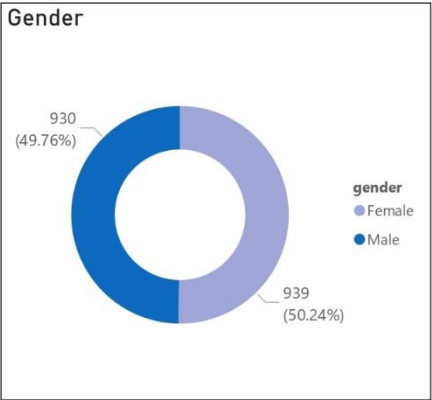
- Q1: How many customers have subscribed to date?
- Q2: How many have unsubscribed from our services?
- Q3: What is the number of current customers?
- Q4: What is the churn rate?
- Q5: What is the average charges per month?
- Q6: What is the annual revenue?
- Q7: What is the sum of Monthly Charges per Internet Service?
- Q8: What is the number of subscribed and unsubscribed customers per their demographic information?
- Q9: What are services the subscribed and unsubscribed customers were using?
- Q10: What is the number of subscribed and unsubscribed customers per their account information?
- Q11: What is tenure distribution of the existing customer?
- Q12: Which factors have the strongest correlation with churn?

## Data Cleaning and Transformation:

- Our dataset consisted of a total of 7043 rows and 21 columns.
- Our data is found in clean form.
- Our dataset looks a bit tidy with no NaNs nor duplicated values.
- **TotalCharges** column has null values that need to be handled, it has 11 nulls, and we replaced them by zero and this is done because we find **tenure** values equal to zero.
- Replaced [0] by [younger] and replaced [1] by [older] in **SeniorCitizen**.
- Added Conditional Column **tenure category** (1:10 [Short], 11:50 [Long], >50 [Very Long])
- No columns needed to be dropped.

Exploration and Key Insights:

Total Customers	Total Churn	Current Subscribed	Churn Rate	Average of Monthly Charges	Annual Revenue
7043	1869	5174	26.54%	64.76	\$5.47M



Gender and Senior Citizen:

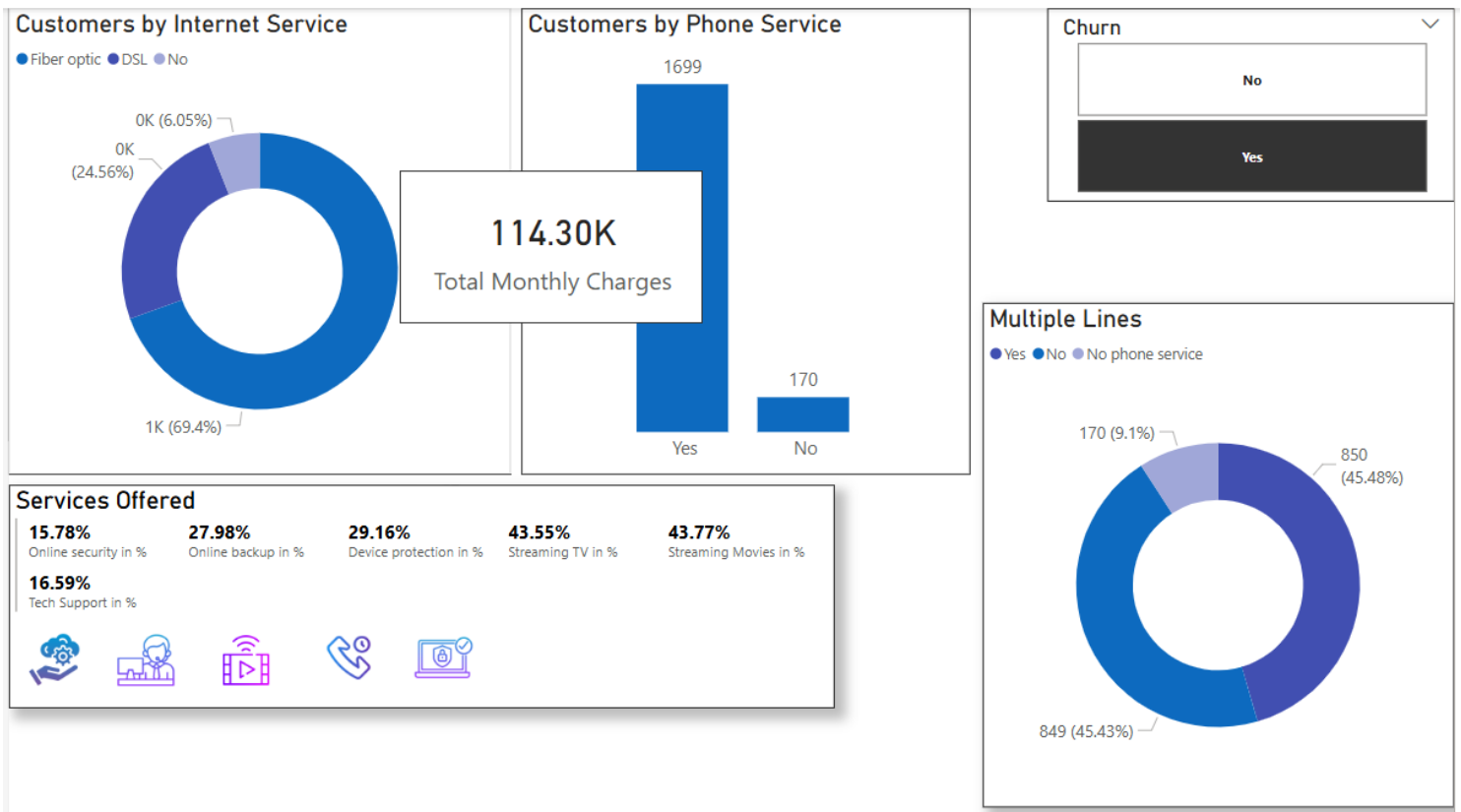
- Gender does not seem to have a significant impact on the churn decision. However, senior citizens are less likely to churn than non-senior citizens.
- Female customers had a slightly higher churn rate, with **939** churned compared to **930** male customers.
- Most churned customers did not have Senior Citizen, making up **74.53%** of total churn.

Partner Status:

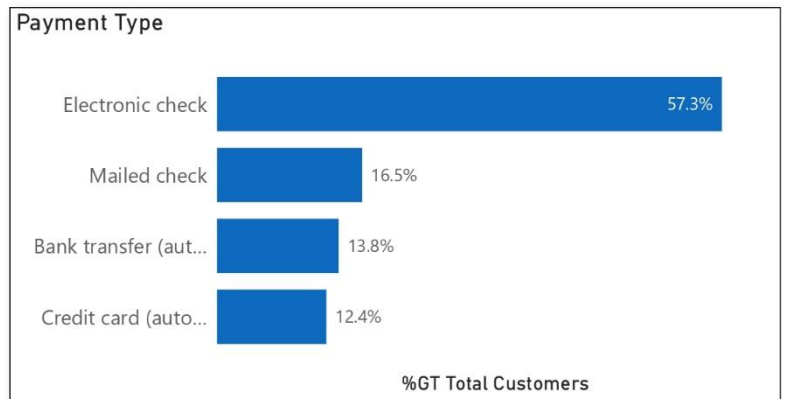
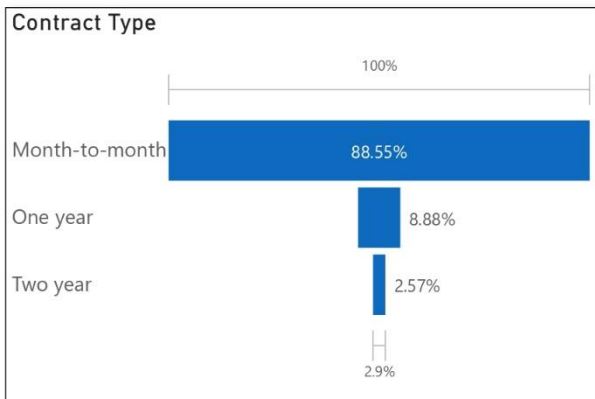
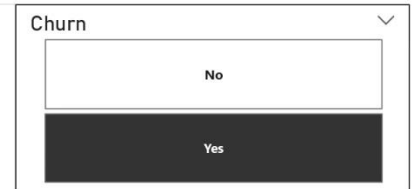
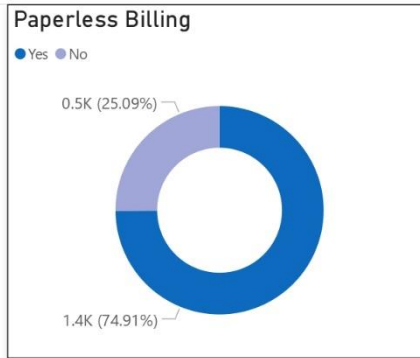
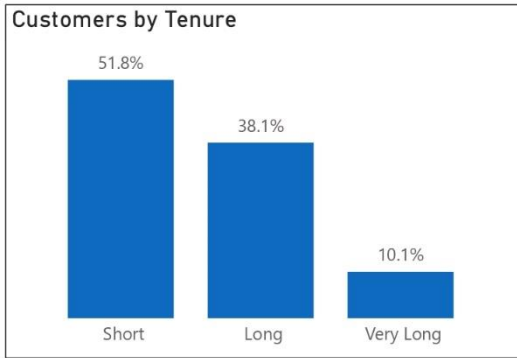
- The majority of churned customers did not have a partner, accounting for **1,200** churned customers, while those with a partner accounted for **669**.

Dependents:

- **82.56%** of churned customers **do not** have **dependents**.
- Customers who do not have any dependents or partners are more prone to churn than those who do, making up **60.09%** of total churn.



- Customers who do not receive services such as **Tech Support**, **Device Protection**, and **Online Security** are more dissatisfied and tend to look for other options.
- 818** customers who subscribed to **Streaming Movies** have churned, while **1,914** subscribers are still with the company.
- 942** customers who did **not** subscribe to **Streaming TV** have churned, while **1,893** non-subscribers remain with the company.
- 1,446** churned customers did **not** have **Tech Support**. Offering this service might reduce churn.
- 849** churned customers had only one phone line (no additional lines).
- 1,461** churned customers did **not** have **Online Security**—a logical reason for their departure.
- 1,233** churned customers did **not** have **Online Backup**.
- 69.4%** of churned customers were using **Fiber Optic** internet service.

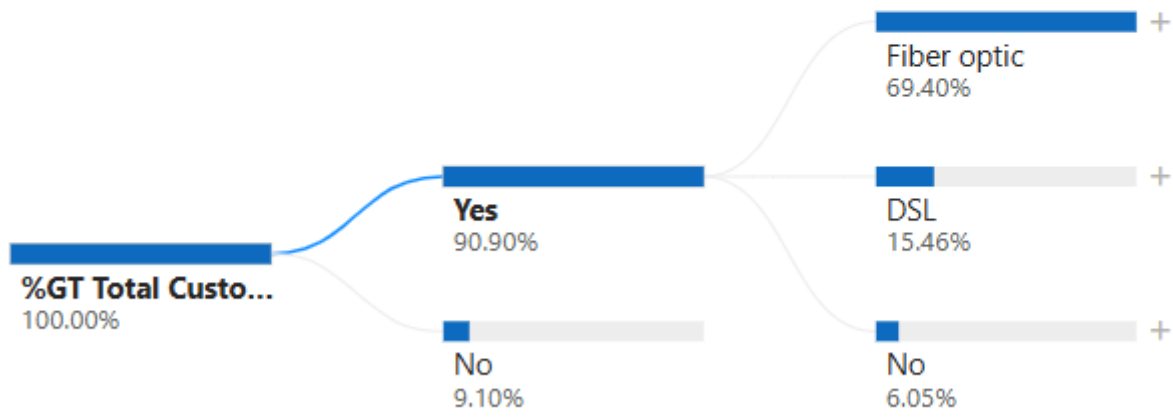


- The length of the **contract** and the **tenure** of the customer are key factors in predicting the churn behavior. Customers who have a monthly contract and a lower tenure are more likely to switch to other providers.
- Customers with **shorter tenure** are more likely to leave the company—indicating a lack of **loyalty**.
- Customers paying via **Electronic Check** are more likely to churn compared to those using **Credit Cards**.
- **74.91%** of churned customers use **Paperless Billing**.

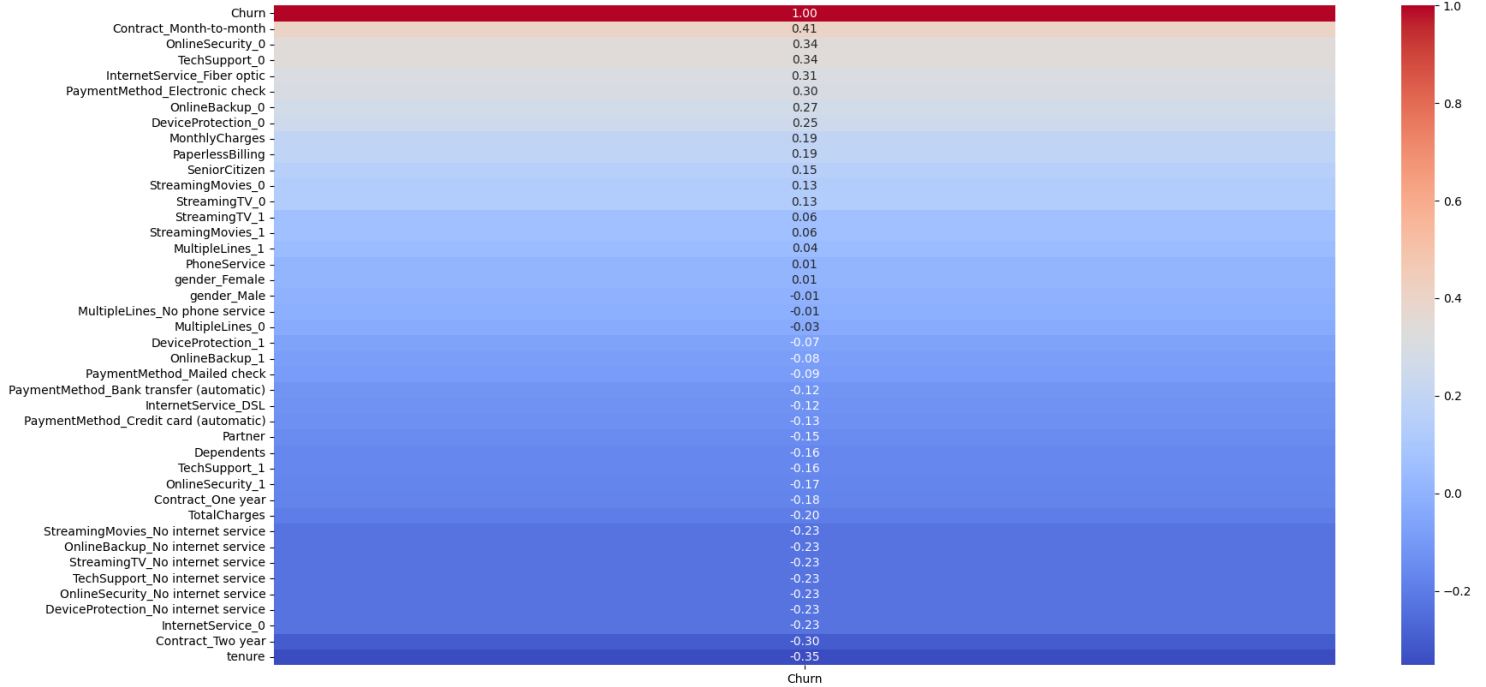
PhoneService x

Yes

InternetService x



**Correlation of Churn with Other Features**



## Key Factors Correlated with Customer Churn

From the heatmap, the most significant factors contributing to churn include:

- High Monthly Charges** – Customers with higher monthly bills are more likely to leave.
- Short Tenure** – Customers with shorter subscription durations are at a higher risk of churning.
- Electronic Check Payment Method** – Customers using electronic checks tend to churn more.
- Fiber Optic Internet** – Customers with fiber optic service have a higher churn rate.
- No Online Security, Backup, or Tech Support** – Lack of these services increases the likelihood of churn.
- Month-to-Month Contracts** – Customers without long-term contracts are more prone to leaving.



## Conclusion:

- **Churn Rate:** The company has a churn rate of 26.5%, with 1,869 out of 7,043 customers at risk. The total annual revenue stands at \$5.47M.
- **High Churn Among Month-to-Month Contracts:** Customers on a month-to-month contract have a higher churn rate compared to those with longer-term contracts, indicating that month-to-month customers may have less loyalty.
- **Dependents and Stability:** customers without partners or dependents have higher churn rates, highlighting a potential need for targeted retention efforts.
- **Impact of Internet Service Type:** Customers using fiber optic internet have a higher churn rate, which could point to service quality or pricing issues with this type of connection.
- **No Add-Ons:** Most churned customers did not subscribe to additional services like online security and tech support, suggesting that bundled services could improve retention.
- **High-Risk Payment Methods:** Customers using electronic checks show a higher churn rate, which could suggest dissatisfaction with billing methods or payment flexibility.

## Recommendations:

### Enhance Retention Among Senior Citizens:

- Develop loyalty programs or personalized offers targeting senior citizens to increase engagement and reduce churn in this demographic.

### Promote Longer-Term Contracts:

- Consider offering discounts or incentives for customers to switch from month-to-month to longer-term contracts. Highlight the value and savings to encourage commitment.

### Focus on Payment Method Options:

- Since electronic check users have a higher churn rate, consider educating these customers on more secure or convenient payment options like bank transfers or credit card autopay. Additionally, offering incentives for switching payment methods might improve retention.

### Engage Paperless Billing Customers:

- Introduce customer engagement programs specifically for paperless billing users. This could involve sending personalized communications, offering exclusive deals, or educating them about additional services.

### Optimize Service Quality for Internet Customers:

- Fiber optic users show a higher churn rate than DSL users. Investing in improving fiber optic service quality.