Summary and Recommendation: Customer Churn Analysis

This analysis explores customer churn data from a telecom company, aiming to identify patterns and factors influencing customer attrition. The dataset includes various customer demographics and service usage details, along with the churn status, allowing for in-depth exploration into what drives churn.

1. Data Preprocessing and Cleaning

- **Missing Values & Data Conversion:**
  - The `TotalCharges` column contained blank entries, which were replaced with `0` and converted into a numeric type (float).
  - The `SeniorCitizen` column, originally represented as 0 and 1, was converted into categorical labels ("yes" and "no") for better clarity.
- **Initial Data Inspection:**
  - The dataset was reviewed for missing values and its general structure, confirming that the majority of the data is clean and ready for analysis.

2. Customer Churn Overview

- **Churn Distribution:**
  - **Bar Chart:** A **count plot** shows the churn distribution, revealing that approximately **26.54% of customers** have churned.
  - **Pie Chart:** A pie chart further breaks down the churn percentage, confirming the high retention rate with most customers staying with the company.

3. Churn Analysis by Demographics

- **Churn by Gender:**
  - A **count plot** segmented by gender suggests that churn is fairly evenly distributed between male and female customers, with no significant gender-based difference in churn rates.
- **Churn by Seniority (SeniorCitizen):**
  - **Stacked Bar Chart:** The churn rate among **senior citizens** (those labeled "yes" in the `SeniorCitizen` column) is notably higher compared to younger customers, indicating that senior citizens are more likely to churn.

4. Churn Analysis by Subscription Tenure

- **Histogram:** A **histogram of tenure** reveals a clear trend: customers who have been with the company for a longer time are less likely to churn, while those with a **shorter tenure (1–2 months)** tend to leave the service. This highlights the importance of focusing retention efforts on newer customers.

5. Churn by Contract Type

- **Count Plot:** The analysis of churn by **contract type** indicates that customers on **month-to-month contracts** are more likely to churn than those on longer-term

contracts (1 or 2 years). This suggests that customers with shorter commitment periods are less loyal.

6. Service Usage and Churn

- **Optional Services:**
  - Multiple **count plots** were created to visualize the churn behavior based on the usage of optional services (e.g., `PhoneService`, `OnlineSecurity`, `DeviceProtection`). Customers who subscribed to **additional services** like `TechSupport`, `OnlineSecurity`, and `DeviceProtection` had **lower churn rates**.
  - In contrast, customers using **Fiber optic internet** showed higher churn, which could suggest dissatisfaction with this service type.
- **Payment Methods:**
  - **Count Plot by Payment Method:** Customers who used **Electronic Check** as a payment method had significantly higher churn rates, indicating that this payment method may correlate with a more transient customer base.

7. Key Insights:

- **Tenure is Crucial:** Customers with a longer tenure are more loyal, and those who churn tend to do so early in their subscription period.
- **Senior Citizens Are More Likely to Churn:** Older customers (senior citizens) have a higher churn rate, highlighting a potential area for targeted retention strategies.
- **Contract Type Matters:** Customers with month-to-month contracts show a higher tendency to churn. Offering longer-term contract options may help improve retention.
- **Service Utilization Influences Churn:** Customers who use additional services (e.g., `TechSupport`, `OnlineSecurity`) are less likely to churn, suggesting these services contribute to higher retention. Conversely, **Fiber optic internet** appears to have higher churn rates, possibly indicating dissatisfaction with this service.
- **Payment Method Correlation:** The payment method is a key indicator of churn risk. Customers using **Electronic Check** are more likely to churn, which could be a target segment for retention efforts.

8. Conclusion and Recommendations:

- To **reduce churn**, the company should consider strategies that focus on:
  - **Enhancing service offerings** (like `TechSupport`, `OnlineSecurity`) to increase customer retention.
  - **Targeting senior citizens** with tailored retention programs to reduce their higher churn rates.
  - Offering incentives or loyalty programs for customers on **month-to-month contracts** to encourage longer-term commitments.
  - Investigating customer dissatisfaction with **Fiber optic internet** and addressing potential service issues.
  - Developing a retention strategy for customers using **Electronic Check** as a payment method, potentially offering them incentives for switching to more stable payment methods.

This analysis provides valuable insights into customer behavior and churn patterns, which can be leveraged to improve customer retention strategies and reduce atraction