

# Statistical Modeling and Analysis Results of the TELCO Customers



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# ST 1009-Exploratory Data Analysis # Group 51 #

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## 1 Introduction

**T**elco Company is a communication-providing company. The report summarizes all the primary statistical modeling and analysis results associated with Telco Company. The company used twelve variables. They are Gender, Partners, Dependence, Tenure, Phone Service, Internet Service, Steaming TV, Contract, Payment Method, Monthly Charges, Total Charges, and Churn. Pie charts, Bar charts, and Histograms use to display clear ideas about those variables. This analysis gains a brief overview to future customers and authorities about Telco. Use two variables and graphing is a useful way method to recognize the behavior of two variables.

The purpose of this analysis is  
**“To recognize company growth of service.”**

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## 2 The Dataset

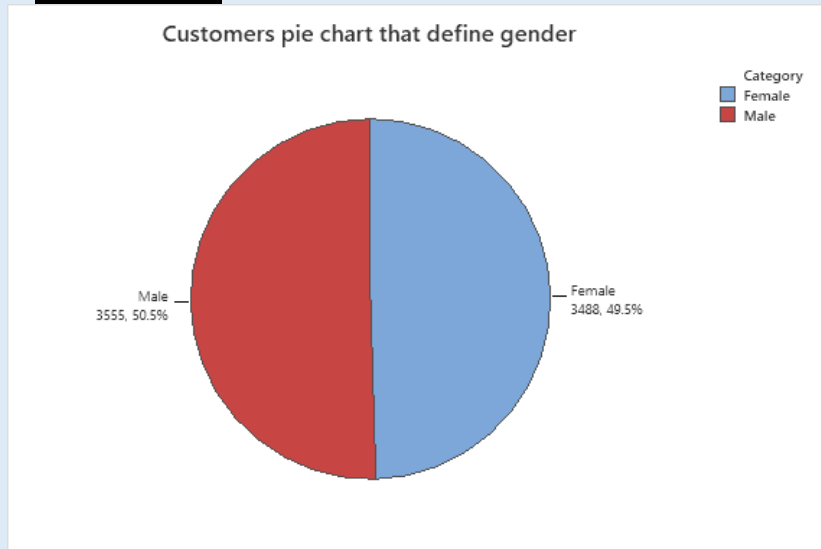
- In the dataset, **Gender** means, whether the customer is a male or a female.
- Where it comes to the **Partner** variable, it shows that the customer has a partner or not.
- In **Dependents**, variable gives us the information about, whether the customer is dependent on another party or not.
- The total number of months customers deal with the company is showed by the **Tenure** variable.
- When it comes to the **Phone Service** variable, we can get a brief idea about the customer who uses phone service.
- Which type of service such as DSL, Fiber optic that the customer is using for their work show by the variable, **Internet service**.
- By considering the **Streaming TV** variable, we can get an idea about whether the customer has a steaming TV or not.
- Three types of contract terms include in this **Contract** variable. There are Month-to-month, One year, Two years.
- The customer paid their payments by using different methods such as Electronic checks, Mailed checks, Bank transfers, and Credit cards. We can identify that by looking at the **Payment Method** variable.
- **The Monthly Charges** variable shows that which amount must be paid by a customer monthly.
- The total amount paid to receive represents the **Total Charge** variable.
- We can verify whether the customer churned or not by looking at the **Churn** variable.

- Variables in the above dataset are categorized into two types of variables.

Qualitative Variables	Qualitative variables
Gender	Tenure
Partner	Monthly Charges
Dependents	Total Charges
Phone service	
Internet service	
Steaming TV	
Contract	
Payment Method	
Churn	

## 3 Descriptive Analysis

### 3.1 Gender

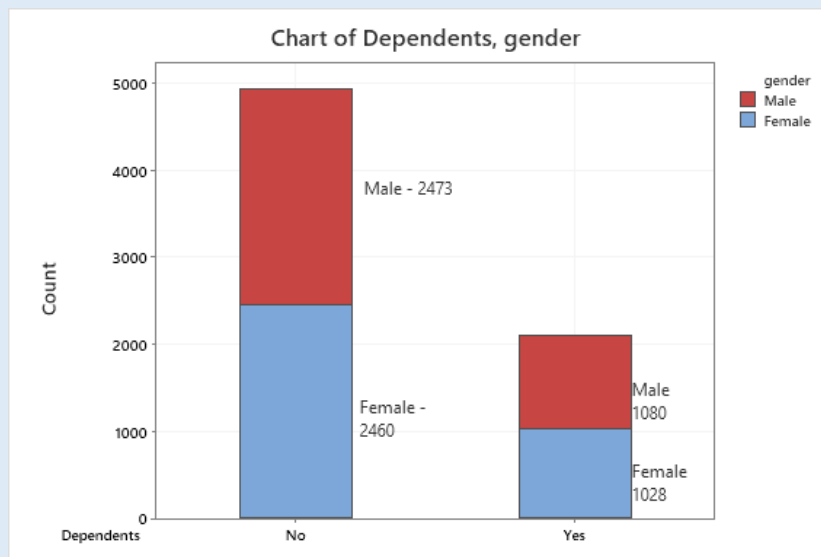


- There are 50.5% male customers and 49.5% female customers.

- This pie chart shows that Telco has the closely same number of male customers and female customers.

- According to our analysis, we can get a brief idea about gender as a disregarded variance to use technology. Virtually all people like to connect with the world. So, technology is an easy way to navigate around the world.

### 3.2 How dependents vary with the gender

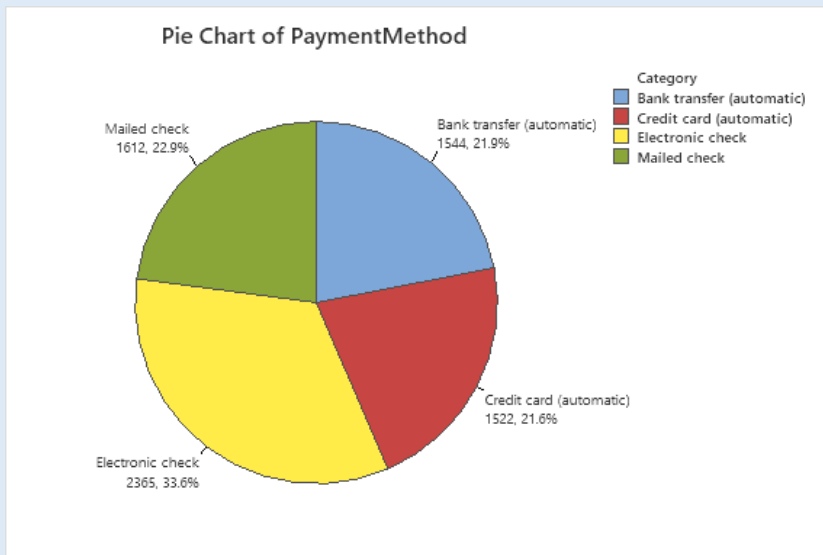


- This bar chart shows that, among the customer of Telco, 4993 customers haven't dependents, 2110 customers have a dependence.

- According to our bar chart, the independent number of customers is higher than depending on customers.

- The bar chart shows independent male and female customer amount has the same extent. Virtually dependents female and male numbers are approximately the same.

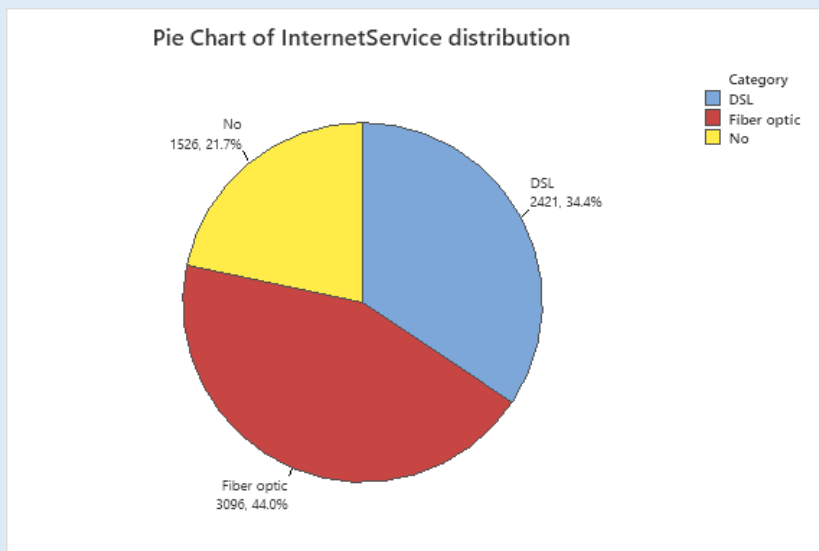
### 3.3 Payment Method



■ This pie chart shows that four categories of customer's paid methods. These are Mail checks, Bank transfers, Credit cards, and Electronic Checks.

- Mailed check, Bank transfer, and Credit card haven't the same amount. But these percentages are approximately the same.
- According to our pie chart, the most popular way to pay their bills is by electronic check.

### 3.4 Internet Service



■ There are two categories in internet service, and someone doesn't use internet service. There are DSL, Fiber optic.

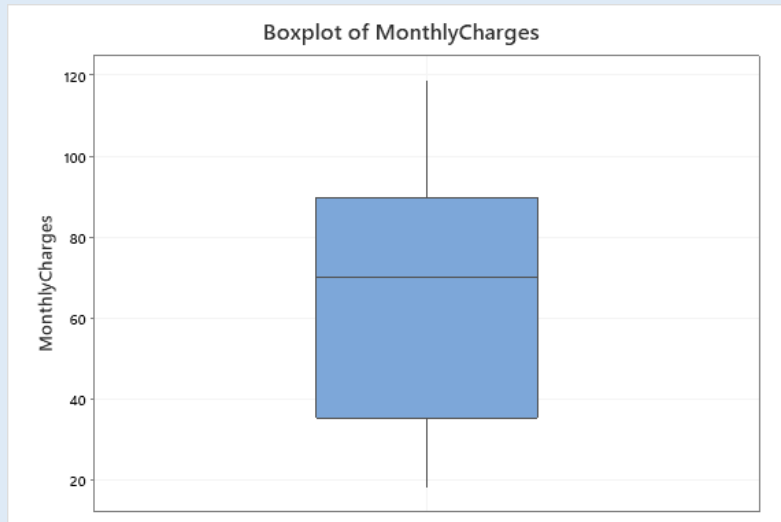
■ Among the customers of Telco, 6517 customers use internet service.

- But 1526 customers aren't interested in internet service.
- DSL and Fiber haven't the same number of customers. But their percentages are approximately the same.

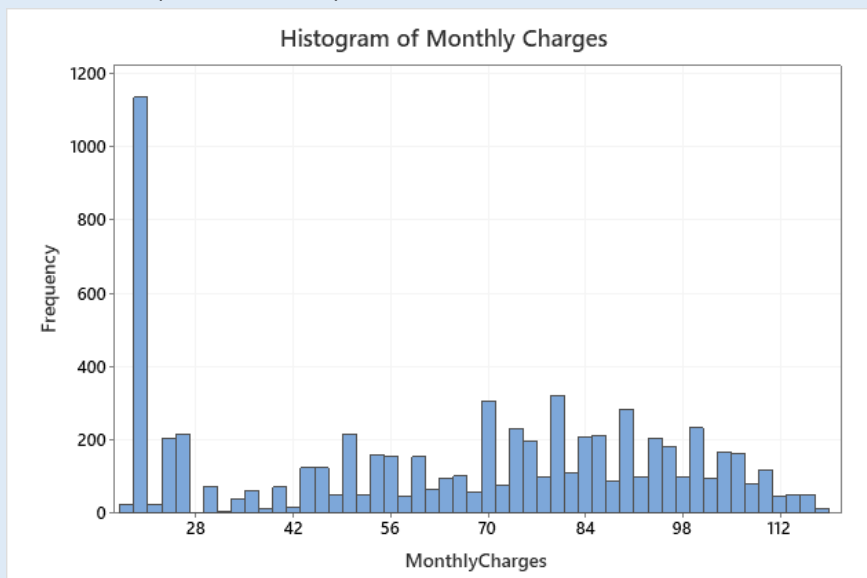
## 3.5 Monthly Charges

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
MonthlyCharges	7043	0	64.762	0.359	30.090	18.250	35.500	70.350	89.850	118.750

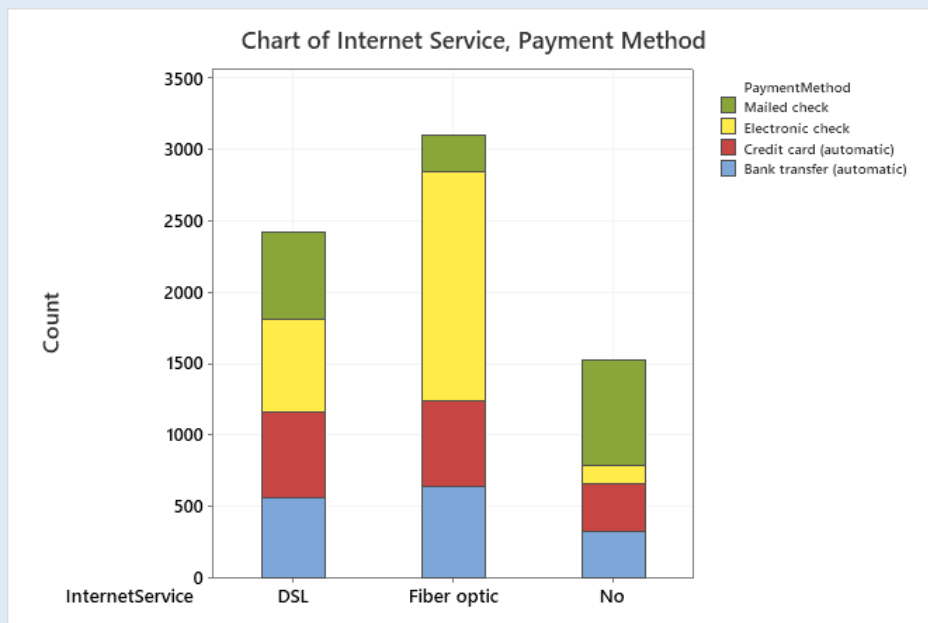
- The first quartile of the Monthly Charges is 35.5 and the third quartile is 89.85



- There are no outliers in this distribution.
- Therefore, the Inter quartile range (IQR) =  $89.85 - 35.5 = 54.35$   
 Low Limit =  $Q1 - 1.5 \times 54.35 = -46.025$   
 Upper Limit =  $Q3 + 1.5 \times 54.35 = 171.375$ 
  - Skewness =  $3 \times (\text{Mean} - \text{Median}) / \text{Standard deviation}$   
 $= 3 \times (64.762 - 70.350) / 30.090$   
 $= -0.5571286142$
- According to the calculations, Skewness < 0, So the distribution has negative skewness (Left skewed).



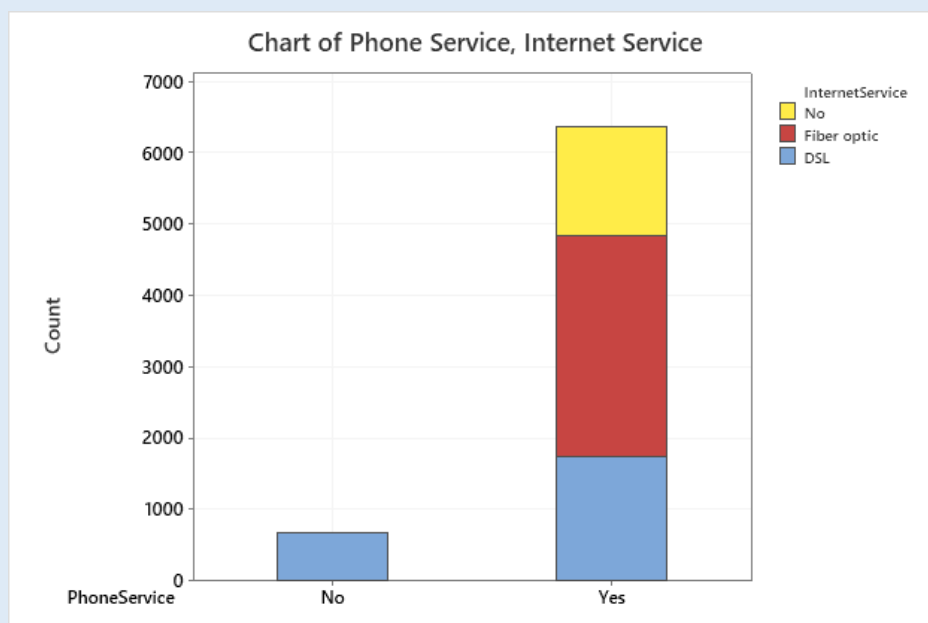
### 3.6 Internet Service & Payment Method



- By looking at the chart we can see how the payment method varies with the internet service.

- Most of the Fiber Optic customers use the electronic check payment method to pay.

### 3.7 Phone Service & Internet Service



- The customers who haven't a phone service, only use DSL internet service.

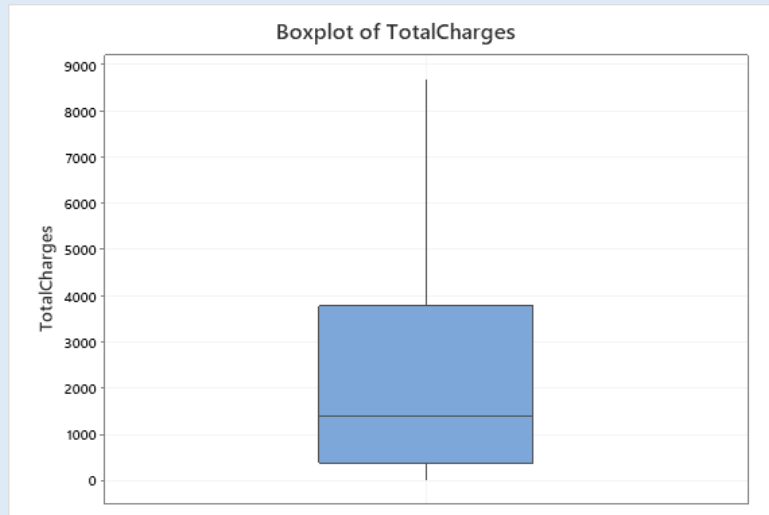
- The customers who have a phone service are propensity to use Fiber Optic service.



## 3.8 Total Charges

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
TotalCharges	7032	11	2283.3	27.0	2266.8	18.8	401.4	1397.5	3795.2	8684.8

- The mean of monthly Charges is 2283.3 and the median of the Monthly Charge is 1397.5.
- The Monthly Charge range is from 18.8 to 8684.8.
- There are 11 missing values in this variable.



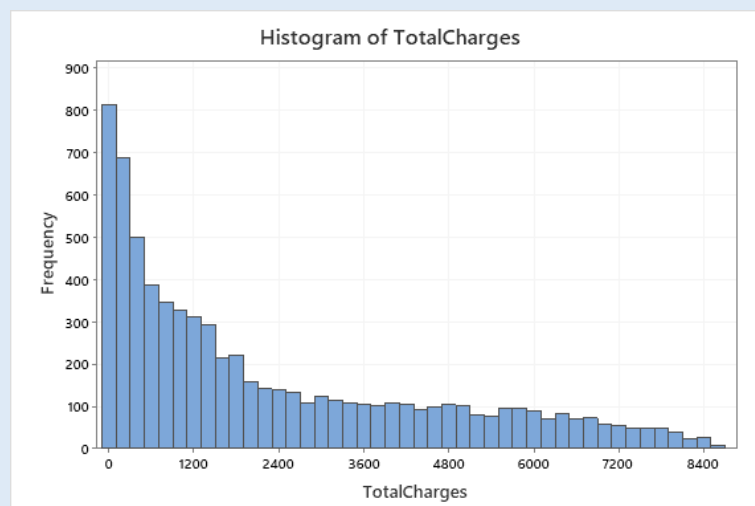
- There are no outliers in this distribution.
- Inter quarter range (IQR) =  $Q3 - Q1 = 3795.2 - 401.4 = 3393.8$   

$$\text{Lower Limit} = Q1 - 1.5 \times (\text{IQR}) = 401.4 - 1.5 \times 3393.8 = -4689.3$$

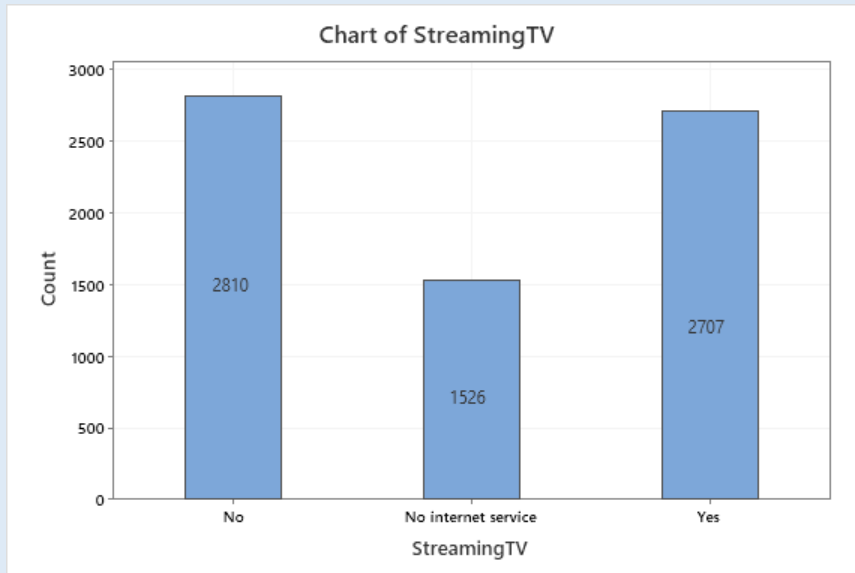
$$\text{Upper Limit} = Q3 + 1.5 \times (\text{IQR}) = 3795.2 + 1.5 \times 3393.8 = 8885.9$$
- Skewness =  $3 \times (\text{Mean} - \text{Median}) / \text{Standard deviation}$   

$$= 3 \times (2283.3 - 1397.5) / 2266.8$$

$$= 0.998853$$
- Skewness > 0, So this distribution has positive skewness (Right skewed).

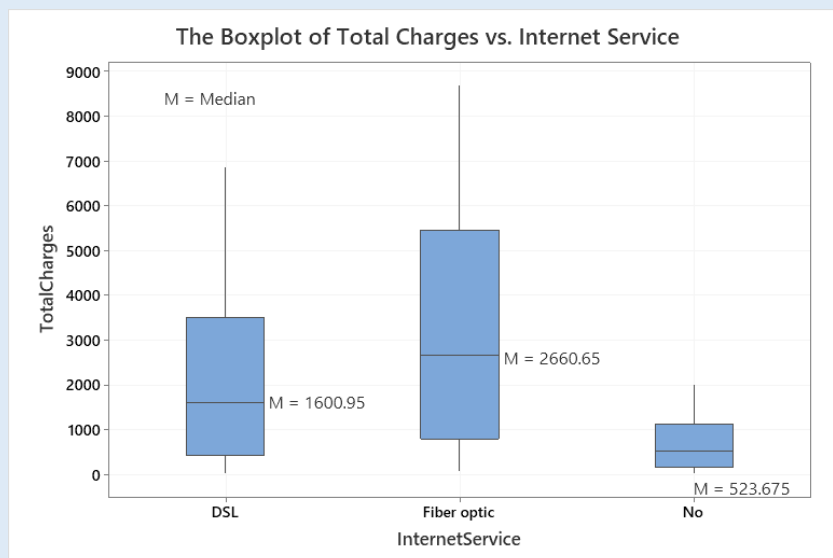


### 3.9 Streaming TV



- According to the bar chart, Telco has three types of customers. There are streaming TV users, the customers who haven't Streaming TV and whose TVs haven't internet service.
- Streaming TV users and the customers who haven't streaming TV have an approximately equally likely of customers.

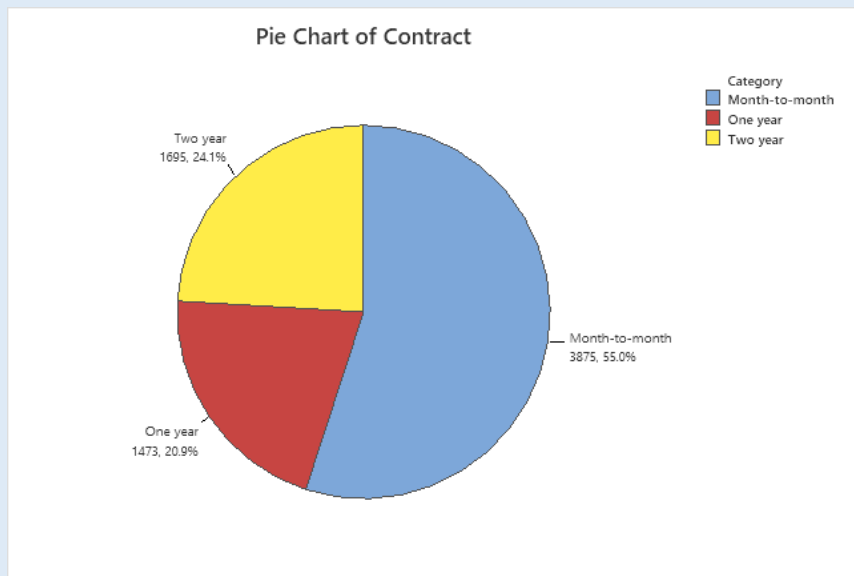
### 3.10 What is the relation between Total Charges and Internet Service?



- The boxplot hasn't any outliers.
- According to this boxplot, Fiber obtain had a huge median than DSL service.

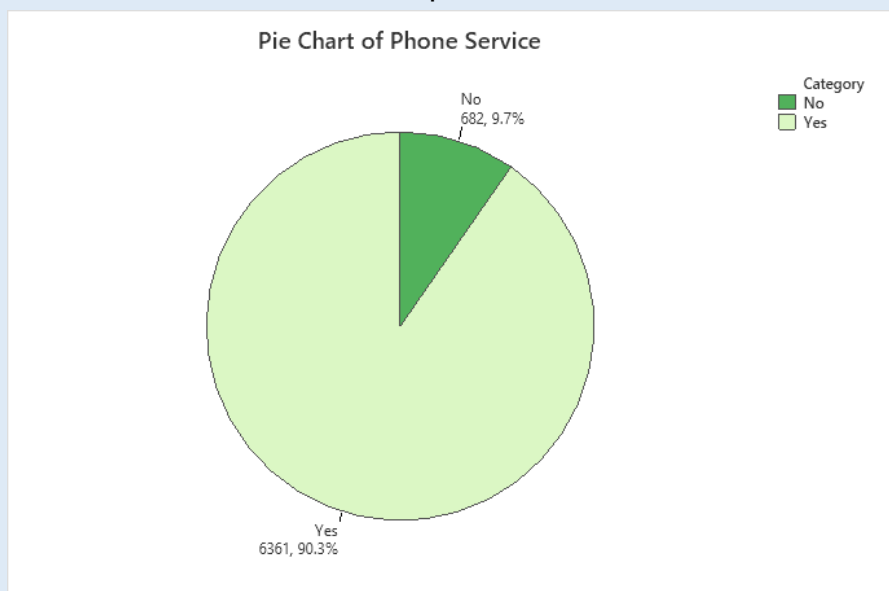
### 3.11 Contract

- According to our pie chart, most of the customers connect with the TELCO Company's month-to-month contract.
- The amount of One year and two-year contracted customers are approximately equal.



### 3.12 Phone Service

- By looking at the pie chart, we can say most of the customers of the TELCO have phone services.
- But 9.7% of customers haven't phone services.



### 4 Conclusion

- According to our analysis, this TELCO service has equally prevalent among male and female customers. As a result, we can get an idea about **gender** is disregard variable to get Telco Service.
- Independent customers have the willingness to get TELCO service. According to our report, we can get a brief idea that TELCO is popular among independent customers. Not only have that **dependents** customer had the propensity to get TELCO service.
- We can get a conclusion from the **monthly charge** variable and dependent variable, whose not have **dependents** tend to pay more and get high quality service.
- Customers of TELCO use to pay their **payment** in deferent methods. So, we can get an idea that TELCO uses to follow customer-friendly service.

The customers who have an income stream have a trend to buy TELCO services. Consumers who use fiber optic technology are increasingly using electronic checks to pay their bills.

- TELCO give their customer to different **services**. There are **DSL** and **Fiber optic**. According to that detail, we can get an idea that TELCO had good technology.
- According to the **contract** variable, TELCO Company gives their customers maximum freedom to contract with them.
- More customers are willing to use Fiber optic facility. So we can get an idea about the quality of fiber optic service.

Looking at a customer who also uses a telephone facility with a quality internet facility such as so. We can get an idea that they are associated with the company for a specific purpose. Like educational purposes, business purposes.

Most of the TELCO **phone service** customers use the **internet service** of TELCO. According to that TELCO gives the exceptional opportunity for phone service customers who are interested in internet service. It is a good determine for TELCO to hold on to their customers.