INTERNATIONAL SCHOOL
VIETNAM NATIONAL UNIVERSITY, HANOI

FINAL REPORT
INS3008 PROJECT

CUSTOMER CHURN ANALYTICS

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Executive Summary

The "Customer Churn Analytics" project for the telecom industry strategically addresses the challenge of customer churn through data-driven insights and predictive modeling. In a fiercely competitive market, the project focuses on identifying at-risk customers and implementing proactive retention strategies. Thorough data analysis, including factors like service quality, pricing, and feedback, leads to accurate predictive models. Customer segmentation based on churn risk enables personalized retention approaches.

The project's impact on ProTel Inc. is noteworthy, providing actionable recommendations, innovative retention strategies, and adaptability to the dynamic telecom landscape for sustainable growth. A user-friendly interface facilitates real-time churn prediction, empowering telecom operators with insights for informed decision-making. In conclusion, the project equips ProTel Inc. with valuable tools to reduce churn rates, foster customer loyalty, and thrive in the ever-evolving telecom industry.

I. Introduction

1. About the Project

In Vietnam's dynamic telecommunications arena, ProTel Inc. is spearheading an innovative venture – the Customer Churn Analytics project. This initiative marks a pivotal moment for ProTel and the industry, aiming to redefine how telecom providers approach the persistent challenge of customer churn. Through advanced data analytics and predictive modeling, the project seeks to equip ProTel with invaluable insights into customer behavior, enabling proactive retention strategies.

Established in 2002, ProTel has been a driving force in Vietnam's telecom sector, synonymous with innovation and technological excellence. Our diverse portfolio, ranging from robust mobile communication solutions to high-speed broadband services, reflects our commitment to meeting the dynamic needs of our discerning customers.

ProTel's Mobile Services go beyond flexible pricing, prioritizing a seamless connectivity experience with a focus on convenience and customer diversity. Additionally, our Internet and Television services offer high-speed connections and a variety of entertainment options.

Recognizing the need for a paradigm shift in churn management, ProTel positions itself at the forefront of innovation within the Vietnamese telecom sector. The Customer Churn Analytics project is designed to leverage data-driven insights, enabling ProTel to anticipate and counteract customer churn effectively.

Customer churn poses a significant threat to revenue and market share, prompting ProTel to move beyond conventional approaches. Leveraging the wealth of customer data, the company aims to pre-emptively address churn and enhance overall customer satisfaction.

ProTel Inc.'s project embraces cutting-edge data analytics and machine learning, signaling a departure from traditional practices in the Vietnamese telecom industry. By delving into historical customer data, uncovering patterns, and predicting churn, the project positions ProTel as a trailblazer in leveraging technology for customer retention.

As a dynamic partner in the Vietnamese telecom sector, ProTel is confident that this strategic approach will solidify its position as an industry leader, creating sustainable value for both its customers and the broader Vietnamese community.

2. Project Goals/Objectives

2.1 Churn Prediction

- Objective: Develop robust predictive models tailored for the Vietnamese telecom market to identify customers likely to churn in the near future.

- Rationale: Anticipating churn in the specific context of Vietnam's telecom landscape is crucial for ProTel to retain its customer base amid fierce competition.

2.2 Features Analysis

- Objective: Conduct a meticulous analysis of customer data within the Vietnamese telecom market to pinpoint key drivers and factors influencing churn, including service quality, pricing, and customer feedback.

- Rationale: Tailoring the analysis to the local market nuances ensures that ProTel gains insights relevant to Vietnam, allowing for strategic and culturally informed decision-making.

2.3 Retention Strategy Recommendations

- Objective: Provide ProTel Inc. with actionable recommendations for retaining high-value customers in Vietnam, encompassing personalized offers, service improvements, loyalty programs, and targeted marketing campaigns.

- Rationale: Customized retention strategies, informed by local insights, enhance ProTel's ability to cater to the unique preferences and behaviors of Vietnamese telecom consumers.

2.4 Interface Development

- Objective: Create a user-friendly interface tailored for ProTel operators, facilitating real-time churn prediction and offering insights for informed decision-making in the Vietnamese market.

- Rationale: Empowering ProTel operators with an intuitive tool specifically designed for the Vietnamese context streamlines operational processes, making churn prediction an integral and effective part of ProTel's strategy.

3. Projects Scope/ Out-of-Scope

The scope of the Customer Churn Analytics project undertaken by ProTel Inc. in the Vietnamese telecom sector is carefully delineated to provide a comprehensive and focused

approach to addressing customer churn. This section outlines the specific dimensions of the project, ensuring clarity and alignment with ProTel's objectives.

3.1 Timeframe

The project's short-term focus revolves around analyzing churn trends, patterns, and contributing factors within the last 6 months. This temporal window allows ProTel to gain immediate insights into recent customer behavior and potential churn triggers.

In tandem with the short-term perspective, the long-term focus extends the analysis horizon to cover the last 2 years. This in-depth historical exploration provides ProTel with a nuanced understanding of evolving customer dynamics and sets the stage for robust predictive modeling.

3.2 Geographic Focus

The geographic focus of the project is explicitly centered on the Vietnam telecom market. By concentrating efforts on the local market, ProTel aims to gain region-specific insights into churn dynamics, customer behaviors, and market-specific factors that influence customer retention.

3.3 Data Collection and Integration

The project involves the meticulous collection of telecom-related data within the specified timeframe (short-term and long-term) and geographic region (Vietnam). This data encompasses a diverse range, including customer profiles, service usage, feedback, and other pertinent variables influencing churn.

Ensuring the readiness and quality of collected data is paramount. ProTel acknowledges potential variations in data sources across different regions and takes proactive measures to address discrepancies, missing values, and outliers. This meticulous approach guarantees the reliability of the subsequent analyses.

3.4 Feature Engineering and Model Development

The project involves the identification and engineering of relevant features crucial for churn prediction and analysis. These features are tailored to capture the intricacies of the Vietnamese telecom market, considering factors such as service quality, pricing, and local customer preferences.

ProTel engages in the development of machine learning models optimized for both

short-term and long-term churn analytics. These models are adaptive to regional nuances and designed to provide accurate predictions specific to the Vietnamese context.

3.5 Customer Segmentation

Telecom customers within Vietnam are segmented based on churn risk and behavior. This segmentation aims to create distinct customer groups, allowing ProTel to tailor retention strategies effectively for different segments.

3.6 Predictive Analytics

ProTel utilizes advanced predictive analytics to forecast short-term and long-term churn rates. This involves an in-depth analysis of regional factors contributing to churn within the specified timeframes.

The project's scope includes the delivery of actionable insights into the factors influencing churn, allowing ProTel to make informed decisions and formulate targeted retention strategies.

In summary, the project's scope encompasses a meticulous analysis of customer churn within the Vietnam telecom market. ProTel focuses on short-term and long-term perspectives, collects and ensures the quality of telecom-related data, engineers feature, develops adaptive machine learning models, segments customers, and utilizes predictive analytics to empower informed decision-making for effective customer retention strategies. This comprehensive approach ensures that the project aligns with ProTel's objectives and contributes meaningfully to the telecom sector in Vietnam.

4. Project Risks/Issues

4.1 Data Privacy and Security

Mishandling or data breaches can lead to significant legal and reputational consequences for ProTel Inc. Given that customer data in the telecom industry often includes sensitive information, any compromise in data privacy and security could result in severe penalties and damage to the company's reputation.

ProTel Inc. will strictly adhere to data protection regulations such as GDPR and implement robust data security measures. This includes encryption, access controls, and regular security audits to safeguard customer information.

4.2 Data Quality Issues

Inaccurate or incomplete data in ProTel Inc.'s telecom analytics project can lead to erroneous predictions and wasted resources. Poor data quality may result from missing values, outliers, or errors in the dataset, impacting the reliability of churn predictions.

To address data quality issues, ProTel Inc. will implement comprehensive data cleansing and validation processes. Regular audits and checks will be conducted to ensure the accuracy and completeness of the data used for predictive modeling.

4.3 Overfitting

Overfitting, where the models become overly complex and perform well on training data but poorly on unseen data, poses a risk. This could lead to false predictions in ProTel Inc.'s churn analytics, impacting the effectiveness of targeted retention strategies.

ProTel Inc. will employ proper model evaluation techniques, cross-validation, and feature selection to prevent overfitting. Regular reassessment and refinement of models will be conducted to ensure they align with real-world scenarios.

4.4 Model Drift

Over time, the factors influencing churn in the telecom industry may change, causing the predictive models to become less accurate. Model drift poses a risk to the long-term effectiveness of ProTel Inc.'s churn prediction system.

ProTel Inc. will implement continuous monitoring of model performance, regularly updating models as needed to adapt to changing customer behaviors. This proactive approach will ensure the ongoing accuracy of churn predictions.

4.5 Privacy Concerns

Privacy concerns among customers in Vietnam may arise if they perceive ProTel Inc. as closely monitoring their behavior. This can lead to dissatisfaction and potential churn if customers feel their privacy is compromised.

ProTel Inc. will transparently communicate data usage and privacy policies to customers. Opt-in/opt-out choices will be provided where applicable, ensuring customers feel in control of their data and maintaining trust in ProTel Inc.'s services.

4.6 Model Interpretability

The lack of transparency in complex machine learning models may make it challenging to explain predictions to stakeholders, including telecom operators and regulatory authorities. This could lead to skepticism or regulatory challenges.

ProTel Inc. will balance model complexity with interpretability, providing clear explanations for predictions when required. Documentation and communication strategies will be implemented to ensure stakeholders understand and trust the insights provided by the models.

5 Project Deliverables

5.1 Churn Prediction Models

ProTel Inc. will deliver accurate predictive models designed to identify potential churners within the Vietnamese telecom market. These models will be based on historical customer data and advanced analytics techniques.

- Development: Comprehensive models leveraging machine learning algorithms.
- Customer Categorization: A list of customers categorized as high-risk churners based on the predictive models.

5.2 Feature Analysis Report

ProTel Inc. will provide a detailed report identifying key factors influencing churn in the Vietnamese telecom industry. This analysis will cover variables such as call drop rates, service quality, pricing, and customer complaints.

- Identification: Clear identification of factors impacting churn.
- Insights: Data-driven analysis outlining the impact of identified factors on customer churn.

5.3 Retention Strategy Recommendations

ProTel Inc. will present actionable recommendations for retaining high-value customers in Vietnam's telecom market. These strategies may include personalized offers, improvements in service quality, loyalty programs, or targeted marketing campaigns.

- Recommendations: Specific and actionable strategies tailored to address churn factors.
- Detailed Report: A comprehensive document outlining the recommended retention

strategies.

5.4 User-Friendly Interface

ProTel Inc. will develop an intuitive and user-friendly interface for telecom operators. This interface will enable real-time churn prediction, access to customer insights, monitoring of sales performance, and visualization of data through an insightful dashboard.

- Interface Development: Creation of a user-friendly interface with specified functionalities.

- Real-time Prediction: Integration of features allowing operators to predict churn in real-time.

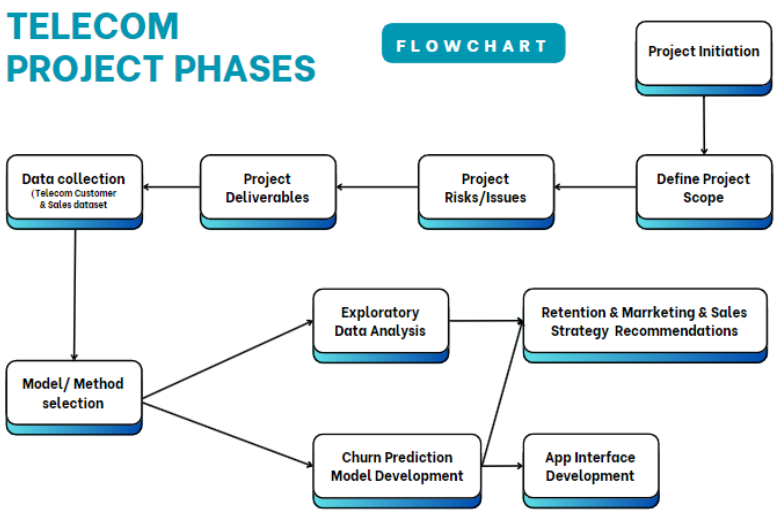
6. Project Contributions of each Member (Thành)

Contributor Name	ID	Sections Worked On
Nguyễn Tuấn Thành	20070980	Project manager, content control Project design Marketing & Sales Campaigns Recommendations Customer retention strategies (50%) Conclusion
Ngô Mai Anh	20070982	Introduction (20%) Exploratory Data Analysis (Sales dataset) Customer retention strategies (30%) Designing (Slides & Word)
Vũ Ngô Bảo Châu	20070904	Introduction (50%) Exploratory Data Analysis (Tele customer churn dataset) Features Analysis Customer retention strategies (20%)
Vũ Minh Hiếu	20070929	Introduction (15%) Data Collection and Preprocessing Telecom market research

Contributor Name	ID	Sections Worked On
Đồng Thanh Dương	20070914	Introduction (15%) Churn Prediction Model Development App Interface Development

II. Methodology and Solution

1. Project design



2. Data collection

The primary objective of this research initiative is to discern the determinants and influences that significantly contribute to customers' decisions to discontinue telecommunications services. The focal point of this study is Hanoi city, where a random and diverse sample of 7,043 company customers will be drawn to ensure representative insights.

The requisite data for analysis encompasses two key categories: customer information and details about the service package utilized by customers. The former includes personal attributes such as name, gender, age, marital status, residential address, and income. The latter

involves specifics about the service contract, encompassing customer service registration, package details, service usage duration, payment methods, monthly payment amounts, and feedback on service satisfaction, covering aspects like service quality, service attitude, response speed, and reliability. Additionally, the method through which customers became acquainted with the company is also a crucial data point.

And here we have created 2 datasets to serve analysis and marketing needs, here is the data description for 2 datasets:

STT	Column	Description	Type data
1	ProductID	Unique value identifying product	String
2	Category	The category of the product	String
3	Kind of Product	The kind of the product	String
4	ProductName	The name of the product	String
5	Description	The description about the product, What will be included in this product package?	String
6	Duration (month)	The duration of service packages product	Integer
7	Price	The price of the product	Integer
8	Quantity	The number people that register for that product	Integer
9	Revenue	The total revenue of the product	Integer
10	Quality Rate	Average product quality rating based on total number of subscribers (1,2,3,4,5)	Integer
11	Consulting Support Rate (attitude)	Average product consulting support rating based on total number of subscribers (1,2,3,4,5)	Integer
12	Service Reliability Rate	Average product service reliability rating based on total number of subscribers (1,2,3,4,5)	Integer
13	Support Speed Rate	Average product support speed rating based on total number	Integer

STT	Column	Description	Type data
		of subscribers (1,2,3,4,5)	

Table1: ProTel Sales dataset

STT	Column	Description	Type data
1	CustomerID	Unique value identifying customer	String
2	Gender	Whether the customer is a male or a female	String
3	Age	The age of customer	Integer
4	Married	Whether the customer is married or not (Yes, No)	Binary
5	District	The district where customer in	String
6	Income	The total income of customer	Integer
7	SeniorCitizen	Whether the customer is a senior citizen or not (1, 0)	Binary
8	Partner	Whether the customer has a partner or not (Yes, No)	Binary
9	Dependents	Whether the customer has dependents or not (Yes, No). A dependent is a person who relies on another as a primary source of income,	Binary
10	Tenure	Number of months the customer has stayed with the company	Integer
11	PhoneService	Whether the customer has a phone service or not (Yes, No)	Binary
12	MultipleLines	Whether the customer has multiple lines or not (Yes, No, No phone service)	String
13	InternetService	Customer's internet service provider (DSL, Fiber optic, No)	String
14	OnlineSecurity	Whether the customer has online security or not (Yes, No, No internet service)	String

STT	Column	Description	Type data
15	OnlineBackup	Whether the customer has online backup or not (Yes, No, No internet service)	String
16	DeviceProtection	Whether the customer has device protection or not (Yes, No, No internet service)	String
17	TechSupport	Whether the customer has tech support or not (Yes, No, No internet service)	String
18	StreamingTV	Whether the customer has tech support or not (Yes, No, No internet service)	String
19	StreamingMovies	Whether the customer has streaming movies or not (Yes, No, No internet service)	String
20	Contract	Type of contract according to duration (Month-to-month, One year, Two year)	String
21	Channel	Where customer find the product (Youtube ads, Facebook ads, Tiktok ads, Advertising Panel, Word of mouth	String
22	PaperlessBilling	Bills issued in paperless form (Yes, No)	Binary
23	PaymentMethod	Payment method used by customer (Electronic check, Mailed check, Credit card (automatic), Bank transfer (automatic))	String
24	MonthlyCharges	Amount of charge for service on monthly basis	Float
25	TotalCharges	Cumulative charges for service during subscription (tenure) period	Float
26	Churn	Showing customer churn or not (Yes, No)	Binary

Table 2 : ProTel Customers churn

Access our dataset:

- ProTel Customer Churn dataset: HERE

- ProTel Sales dataset: HERE

A two-pronged strategy that includes both past customer records and a specially created survey has been put into place to collect thorough data. The online survey is administered via well-known survey platforms and includes both multiple-choice and open-ended questions that are specific to the variables and goals of the study. A randomly chosen sample of both current and churned customers receives this survey via direct calls and online communication channels.

Concurrently, the abundance of data housed in the organization's IT system—specifically, the customer service management system—is utilized. Accessing contract details, service usage records, billing data, and other pertinent indications connected to customer service involvement are necessary for this.

The systematic data collection process follows a sequence of steps beginning with crafting online survey questions that are in keeping with the goals of the study. Online surveys are then distributed via distribution links and client calls. Concurrently, information is taken out of the business's IT system, and to protect client privacy and ease further analysis, the data is categorized, verified, and encrypted. This entails grouping data, including transaction history, personal information, and customer reviews, into specific categories.

To broaden survey participation, consultants engage active service users through phone interviews, while online communication methods are employed to reach both existing and potential respondents. Physical visitors to the company's locations or those availing technical support services are also included in our survey outreach.

Adherence to stringent data security regulations remains a top priority throughout, guaranteeing the confidentiality and safety of customers' personal information. This comprehensive approach aims to unravel the nuanced dynamics of customer churn and pave the way for strategic interventions to minimize churn rates effectively.

3. Model development

In constructing a predictive model tailored for the telecom industry, the initial phase involves meticulous preprocessing steps. This encompasses addressing missing values through methods like mean imputation, ensuring data integrity by eliminating duplicates, and segmenting the dataset into distinct training and testing sets. Categorical variables, such as customer service plans, undergo label and one-hot encoding to facilitate numerical

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interpretation, while feature scaling normalizes diverse data scales for uniform model training. Addressing imbalanced datasets, a common scenario in telecom with limited instances of customer churn, necessitates employing techniques like SMOTE.

Subsequently, a suite of predictive models, including Decision Trees and Logistic Regression, undergo rigorous evaluation and fine-tuning through hyperparameter optimization. Feature selection identifies pivotal indicators such as usage patterns and billing history, optimizing model efficiency and interpretability. The crux of the evaluation lies in the F1-score, a vital metric, especially in scenarios with imbalanced datasets, aiding in the selection of the most effective model. The ultimate aim is to distill actionable insights into customer behavior, empowering telecom stakeholders to enhance decision-making in customer retention and targeted marketing strategies. This comprehensive approach aims to offer a nuanced understanding of customer churn, fostering a data-driven paradigm within the telecom sector.

access.github for more details.

III. Implementation and Results Analysis

1. ProTel Customer Churn Analysis

1.1. Exploratory Data Analysis

In EDA we use 2 softwares are PowerBI and Python to analyze and visualize to have a comprehensive view of the project and the main factors affecting customer churn within the company.

PowerBI for Customer Churn Exploratory Data Analysis (EDA)

ProTel Inc. will leverage PowerBI to enhance the exploratory data analysis (EDA) process for customer churn in the telecom industry. The PowerBI tool offers robust capabilities for creating insightful visualizations and dashboards

Chart Creation:

PowerBI's charting features will be employed to generate a variety of visual representations. Bar charts can be utilized to showcase the distribution of churn across different customer segments, providing a quick overview of high-risk areas. Additionally, line charts may be employed to illustrate trends in churn over time, enabling a temporal understanding of customer behavior.

Dataset CSV Integration:

PowerBI seamlessly integrates with CSV datasets, making it convenient for ProTel Inc. to import and work with the cleaned and processed customer churn data. The tool's user-friendly interface facilitates a smooth import process, ensuring that the data is readily available for visualization and analysis.

Python in Google Colab for Customer Churn Exploratory Data Analysis (EDA)

Google Colab, equipped with Python, will serve as a powerful environment for conducting exploratory data analysis (EDA) on the customer churn dataset. The combination of Python's data manipulation libraries and Google Colab's collaborative features makes it an ideal choice.

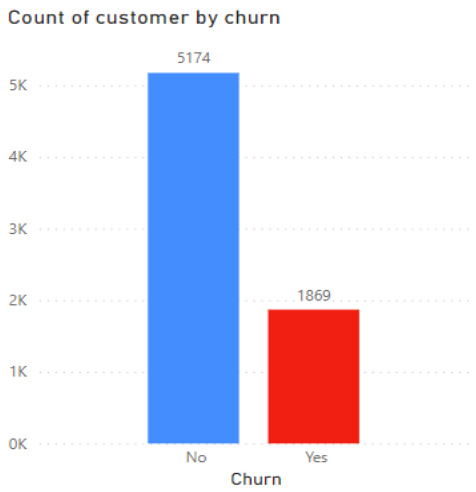
Correlation Analysis:

Using Python in Google Colab, ProTel Inc. will perform correlation analysis on relevant features within the dataset. The Pandas library will be employed to calculate correlation coefficients, providing insights into the relationships between different variables. Understanding these correlations is crucial for identifying factors contributing to customer churn.

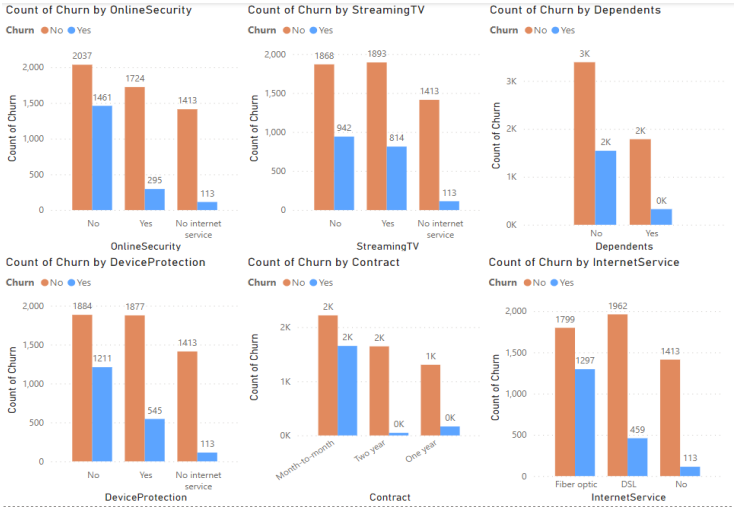
Heatmap Visualization:

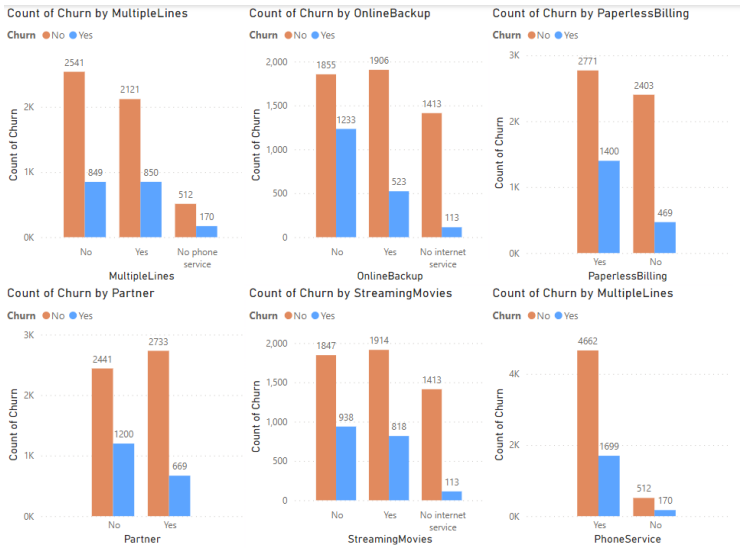
Python's Seaborn library, accessible in Google Colab, will be utilized to create a heatmap visualization of the correlation matrix. This heatmap offers a clear and intuitive representation of the strength and direction of correlations between various features. The visual output aids in identifying patterns and relationships, assisting ProTel Inc. in making informed decisions based on the data.

In our dataset, we have 7043 customers and below are the results when we EDA the dataset and visualization by using PowerBI.



Count of Churn by Each Service and Factors





Observations

Online Security

Approximately 30% of customers have opted for online security. The majority of customers do not have online security or backup. Customers with online security services have a significantly lower churn rate compared to those without this service. This indicates that online security is an important customer factor and can help reduce the churn rate.

Online Backup

Customers with online backup services have a lower churn rate compared to those without this service. This also suggests that online backup is an important factor for customers and can contribute to reducing the churn rate.

Dependents

Around 30% of customers have dependents. Customers with dependents have a higher churn rate compared to those without dependents. This may be because customers with dependents have more needs and may be harder to satisfy with a single service.

Internet Services

People prefer Fiber Optics over DSL for internet services. Customers using fiber optic internet services have a lower churn rate compared to customers using DSL internet services.

This could be because fiber optic internet services are faster and more stable than DSL internet services.

Multiple Lines

Approximately 40% of customers have multiple phone lines. Customers using more than one phone line have a lower churn rate compared to those using only one phone line. This could be because customers with multiple phone lines have more needs and may be more satisfied with the company's service.

Contract

The type of contract has a strong correlation with churn. Customers with month-to-month contracts have the highest churn rate, while those with two-year contracts have the lowest. This suggests that longer commitments are associated with lower churn, which could be due to the higher switching costs or the benefits received over a longer contract duration.

Streaming TV & Movie

Around 37% have registered for streaming TV and movie services. Customers using streaming TV and movie services have a lower churn rate compared to those not using this service. This could be because customers using streaming services have more needs and may be more satisfied with the company's service.

Paperless Billing

The majority of customers have opted for paperless billing. Customers using paperless billing have a lower churn rate compared to those using paper billing. This could be because customers using paperless billing may save time and money.

TechSupport

The TechSupport chart illustrates the customer churn rate for technical support services. The majority of Customers don't have Tech Support. The highest churn rate is observed among those who do not use Internet services. This may be because they do not require technical support if they are not utilizing the internet.

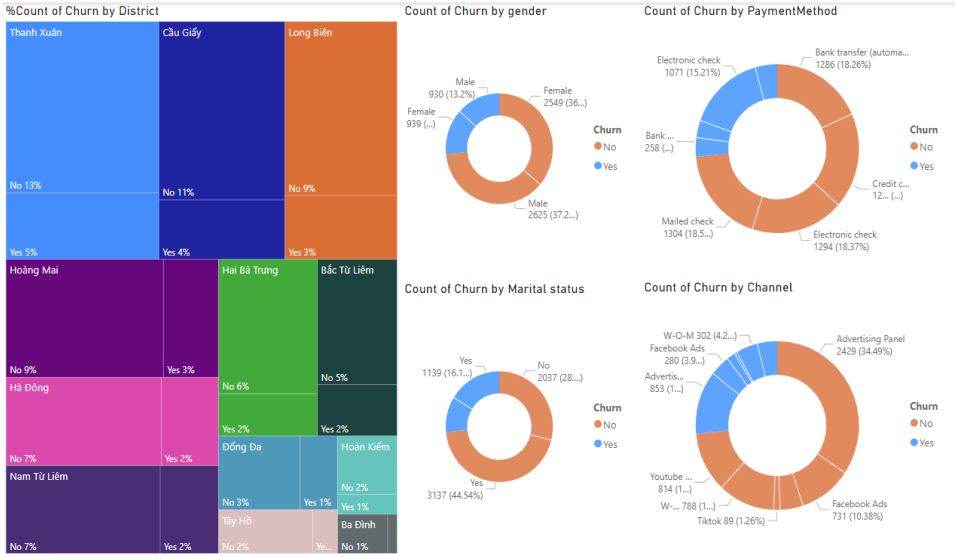
DeviceProtection

The DeviceProtection chart displays the customer churn rate for device protection services. The churn rate is 35%, indicating that for every 3 users, 1 person leaves the service. Similar to TechSupport, the highest churn rate is among those who do not use internet

services. The lowest churn rate is observed among those who have both internet services and technical support. This may be because these individuals have more devices that require protection.

PhoneService

The PhoneService chart shows the customer churn rate for phone services. The churn rate is 85%, and the disparity in churn between subscribers and non-subscribers to phone service is quite stark, with subscribers being the majority. This could suggest that while a phone service is a commonly used feature, there may be underlying issues such as service dissatisfaction, cost, or competitive offerings that are driving these customers away.



District

The treemap chart illustrates the percentage of churn for each district. Thanh Xuan district has the highest non-churn rate at 13% and a churn rate of 5%. In contrast, Long Bien district has the lowest non-churn rate at 9% and a churn rate of 3%. Specific figures like these may indicate satisfaction levels or specific issues in each district. The churn rate exhibits significant variations across different regions, suggesting the presence of specific local factors or varying levels of competition influencing churn rates among districts.

Gender

Data indicates a relatively balanced churn rate between males and females, with a minor difference. This suggests that gender may not be a primary determining factor for churn in the telecommunications environment.

Marital status

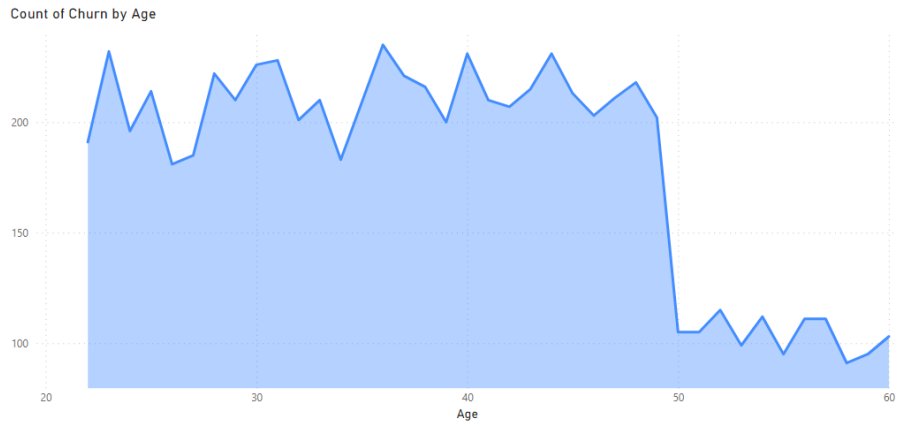
The donut chart shows the churn rate by gender, with females having a churn rate of 36% (2549 non-churn and 939 churn) and males having a churn rate of 37.2% (2625 non-churn and 930 churn). The slight difference between the genders suggests that gender may not be a strong determining factor for churn.

Payment method

The churn rate by payment method reveals that users of electronic checks have the highest churn rate at 18.37% (1294 churn) and 15.21% non-churn (1071). In contrast, users of bank transfers have the lowest churn rate at 18.26% (1286 non-churn). Diverse payment methods show variations in churn rates, with electronic checks and mailed checks having the highest churn rates. This might indicate differing levels of convenience or reliability associated with modern payment methods.

Marketing channel

The final chart shows the churn rate by marketing channel, with advertising panels having the highest churn rate at 34.49% (2429 non-churn) and TikTok having the lowest churn rate at 1.26% (89 churn). This suggests the varying effectiveness of different marketing channels and their influence on customer retention.



Age

The Churn by Age graph shows the customer churn rate by age. According to this graph, the churn rate is **higher for younger customers**. This could be because younger customers tend to change their preferences and needs more often.

OVERALL,

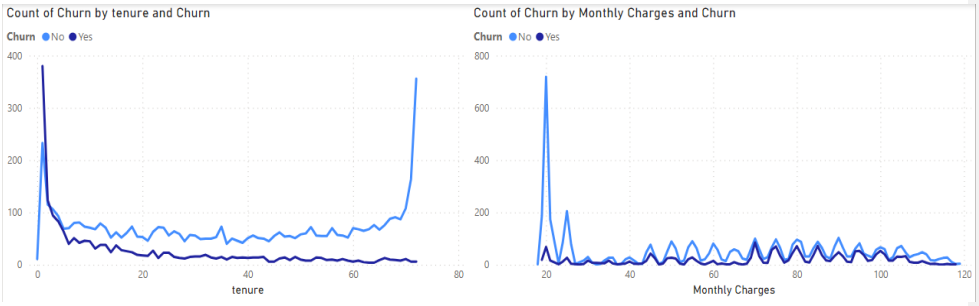
From the above analysis, churn customers are likely to:

- Not having partners and Dependents; Means likely to be Single.
- Have Internet service and specifically Fiber optics
- Not have online security service, online backup service, device protection service, Tech support service
- Have streaming TV and streaming Movie services
- Be with a monthly contract
- Have a paperless billing service
- Have an electronic check payment method

Distribution of Tenure, Monthly Charges

Right now, in our dataset, we have continuous variables that are Tenure, and monthly charges. So let's deep dive into these variables.

- Tenure Distribution shows that customers who have tenure around less than a year leave the brand more
- Monthly Charges Distribution shows that customers who have more than $65 left brands more



Tenure:

- Not a normal distribution. Bi-Modal distribution (having 2 peaks) which means data is concentrated across two different groups

- We have a major chunk of customers in a 0 -1 month period. A lot of them might be customers who tried the service and left or liked the service and continued

- Between 10 months to 65 months, we can see a flat distribution of data.

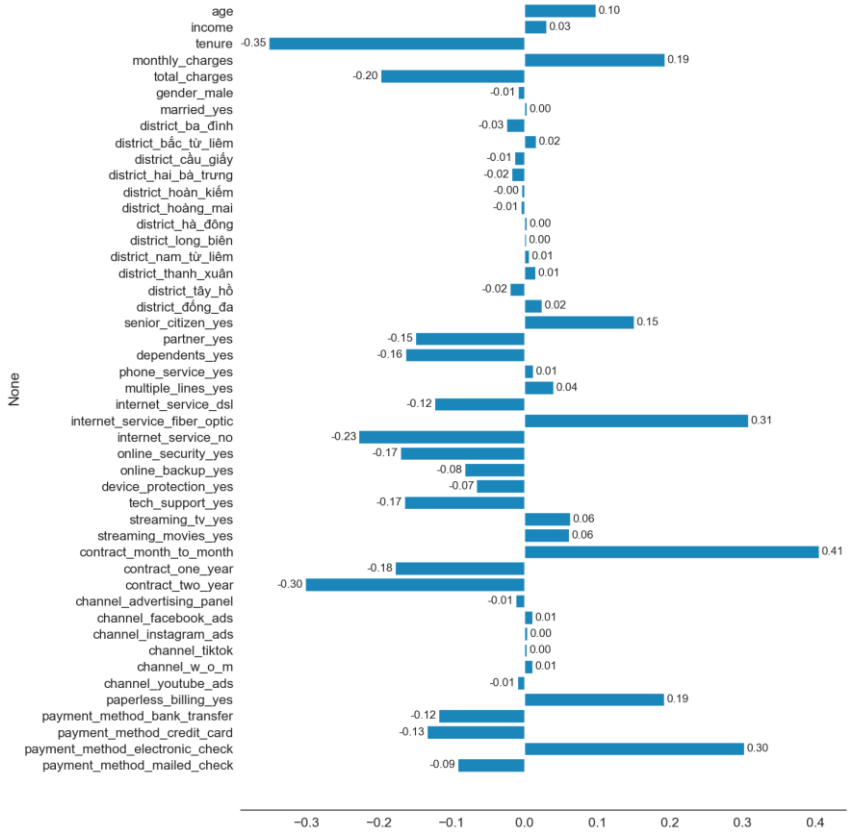
- We have a lot of customers in the 69-72 months range. They are the loyal customers

- As we can see the higher the tenure, the lesser the churn rate. This tells us that the customer becomes loyal with the tenure

Monthly Charges

- The majority of customers are paying 18 to 20 dollars. Must be the service charge for basic service. The majority of customers are subscribed to the basic package.

- Between 70 and 100 dollars, we have quite a few customers. They might be the ones subscribed for multiple services.



Observations on factors other than churn

The provided image is a vertical heatmap displaying the correlation of various features with churn. Here are some detailed observations based on the image:

- **Month-to-Month Contracts:** The highest positive correlation with churn (0.41) suggests that customers with month-to-month contracts are much more likely to churn than those with longer-term contracts. This could be due to the lack of long-term commitment and the ease of switching providers.

- **Fiber Optic Internet:** Shows a significant positive correlation with churn (0.31), indicating that customers with fiber optic connections may have higher expectations and are more sensitive to issues that could lead to churn.

- **Electronic Check Payment:** A notable positive correlation with churn (0.3) implies that the method of payment could influence customer satisfaction. This may reflect a preference for more modern or automated payment methods.

- **Monthly Charges:** Moderate positive correlation with churn (0.19), indicating that as monthly charges increase, the likelihood of churn also goes up. This could be due to customers seeking more cost-effective options.

- **Paperless Billing:** Also has a moderate positive correlation with churn (0.19). While paperless billing is generally seen as convenient, it could be that less tech-savvy customers may find it challenging and may prefer traditional billing methods.

Conversely, some features show a strong negative correlation with churn, meaning these factors are associated with lower churn rates:

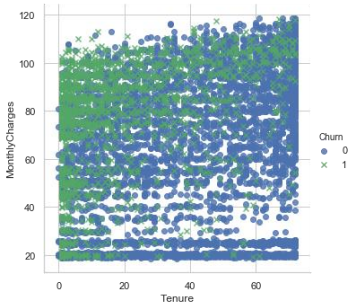
- **Tenure:** Strong negative correlation with churn (-0.35), suggesting that the longer a customer stays with the company, the less likely they are to churn. Long-term customers might be more satisfied or simply less inclined to go through the hassle of changing providers.

- **Two-Year Contracts:** Significant negative correlation with churn (-0.3), indicating that customers on two-year contracts are less likely to churn, likely due to the stability and possibly better pricing options.

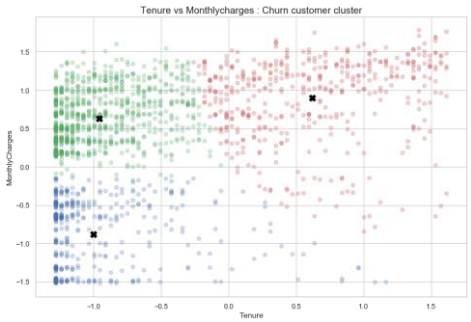
- **No Internet Service:** Negative correlation with churn (-0.23), which could indicate that customers who do not use internet services (perhaps only using phone services) are less concerned with the factors that cause internet customers to churn.

These correlations can be valuable in identifying which features contribute most to customer churn. Our companies can use this information to target areas for improvement, such as reviewing pricing structures, contract terms, and payment method options, as well as focusing on customer service for long-term and high-tenure customers to further reduce churn rates.

Customer Segmentation



From the analysis, we can see that there are some clusters related to churn based on tenure and monthly charges.



Based on the K-means cluster graph, we can see that three groups are more likely to churn

a) Low Tenure and High Monthly Charges (Green cluster)

b) High Tenure and High Monthly Charges (Red cluster)

c) Low Tenure and Low Monthly Charges (Blue cluster)

From the distribution, the graph shows that around 50% of the customers belong to the cluster Low Tenure and High Monthly Charges.

```
(seniorCitizen_dist,seniorCitizen_cluster_cnt) = cluster_analysis(df_cal,df_cluster_gp,'SeniorCitizen')
print(seniorCitizen_dist)
print(seniorCitizen_cluster_cnt)
```

```
Churn  SeniorCitizen
0      0               0.871279
       1               0.128721
1      0               0.745318
       1               0.254682
Name: SeniorCitizen, dtype: float64
   Cluster  SeniorCitizen  Percentage
0        0              0    0.725263
1        0              1    0.274737
2        1              0    0.667401
3        1              1    0.332599
4        2              0    0.862366
5        2              1    0.137634
```

```
contract_Dist,contract_cluster_cnt = cluster_analysis(df_cal,df_cluster_gp,'ContractType')
print(contract_Dist)
print(contract_cluster_cnt)
```

```
Churn  ContractType
0      Month-to-month    0.429068
       Two year          0.318322
       One year          0.252609
1      Month-to-month    0.885500
       One year          0.088818
       Two year          0.025682
Name: ContractType, dtype: float64
   Cluster    ContractType  Percentage
0        0  Month-to-month    0.983158
1        0        One year    0.016842
2        1  Month-to-month    0.625551
3        1        One year    0.279736
4        1        Two year    0.094714
5        2  Month-to-month    0.939785
6        2        One year    0.049462
7        2        Two year    0.010753
```

```
(gender_dist , gender_cluster_cnt) = cluster_analysis(df_cal,df_cluster_gp,'Gender')
print(gender_dist)
print(gender_cluster_cnt)
```

```
Churn  Gender
0      Male      0.507344
       Female    0.492656
1      Female    0.502408
       Male      0.497592
Name: Gender, dtype: float64
   Cluster  Gender  Percentage
0        0  Female    0.531579
1        0    Male    0.468421
2        1    Male    0.519824
3        1  Female    0.480176
4        2    Male    0.535484
5        2  Female    0.464516
```

```
billing_Dist,billing_cluster_cnt = cluster_analysis(df_cal,df_cluster_gp,'PaperlessBilling')
print(billing_Dist)
print(billing_cluster_cnt)
```

```
Churn  PaperlessBilling
0      1                  0.535562
       0                  0.464438
1      1                  0.749064
       0                  0.250936
Name: PaperlessBilling, dtype: float64
   Cluster  PaperlessBilling  Percentage
0        0                 1    0.812632
1        0                 0    0.187368
2        1                 1    0.803965
3        1                 0    0.196035
4        2                 1    0.565591
5        2                 0    0.434409
```

```
payment_Dist,payment_cluster_cnt = cluster_analysis(df_cal,df_cluster_gp,'PaymentMethod')
print(payment_Dist)
print(payment_cluster_cnt)
```

```
Churn  PaymentMethod
0      Mailed check                0.252029
       Electronic check            0.250097
       Credit card (automatic)     0.249324
       Bank transfer (automatic)   0.248550
1      Electronic check            0.573034
       Mailed check                0.164794
       Bank transfer (automatic)   0.138042
       Credit card (automatic)     0.124131
Name: PaymentMethod, dtype: float64
    Cluster             PaymentMethod  Percentage
0         0          Electronic check    0.677895
1         0  Bank transfer (automatic)   0.120000
2         0              Mailed check    0.116842
3         0   Credit card (automatic)    0.085263
4         1          Electronic check    0.528634
5         1   Credit card (automatic)    0.215859
6         1  Bank transfer (automatic)   0.211454
7         1              Mailed check    0.044053
8         2          Electronic check    0.402151
9         2              Mailed check    0.380645
10        2   Credit card (automatic)    0.113978
11        2  Bank transfer (automatic)   0.103226
```

Based on the above information,

a) Cluster 0 - Less tenure and high monthly charges

More likely to be Female, senior citizen, Internet service user, month-to-month service, paperless billing method and Electronic check payment method

b) Cluster 1 - High tenure and High monthly charges

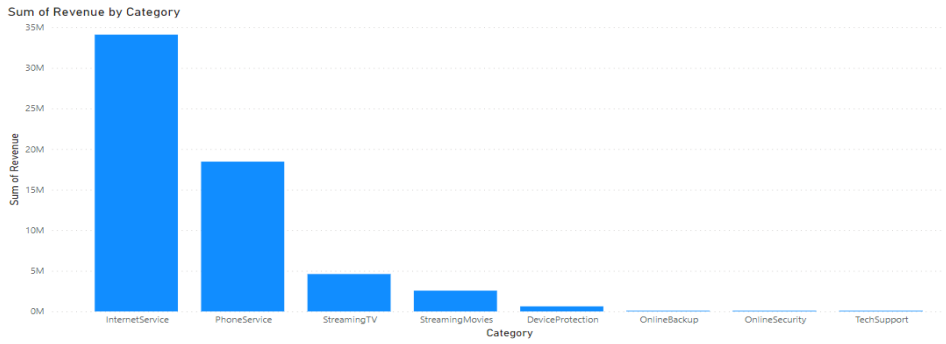
More likely to be male, senior citizens, internet service users, and streaming movies service and paperless billing method and Credit card (automatic)/Bank transfer(automatic) payment method

c) Cluster 2 - Less tenure and low monthly charges

More likely to be male and month-to-month service and Mailed check payment method

1.2. Products

1.2.1. Sales Revenue by Category and Product Type



- **Categories:**

+ Internet Service: $34,101,732

+ Phone Service: $18,455,912

+ Streaming TV: $4,605,449

+ Streaming Movies: $2,563,100

- **Product Types:**

+ For Business/Big Family: $13,841,650

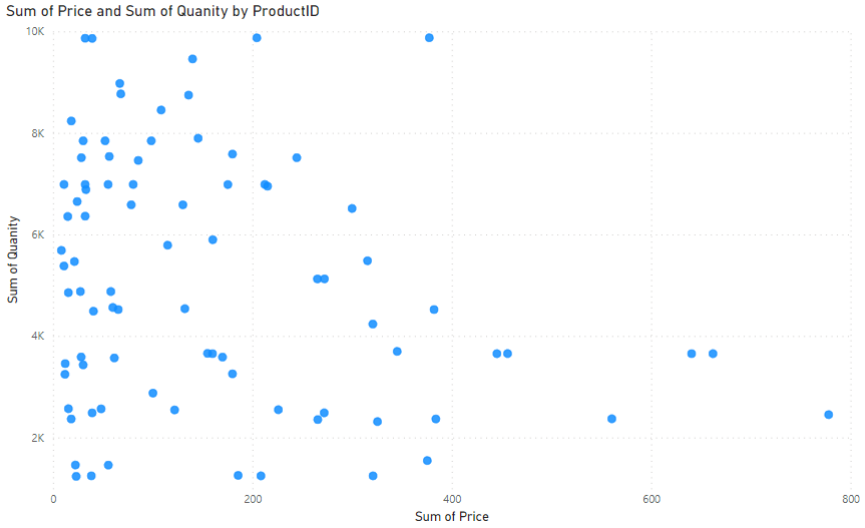
+ For Family: $11,055,224

+ Internet Data: $9,026,940

+ Call and Message: $4,928,435

Insight: Internet services dominate sales revenue, suggesting a strong market demand. Products tailored for business or large families also perform well.

1.2.2. Price vs. Quantity Sold



The scatter plot does not show a straightforward linear relationship between price and quantity sold. This suggests that sales quantity is influenced by factors beyond just the price, such as product type, customer preferences, and perceived value.

Possible Price Sensitivity: There may be segments within the data

1.2.3. Customer Ratings Analysis

- Average Ratings:

- Quality Rate: 3.44

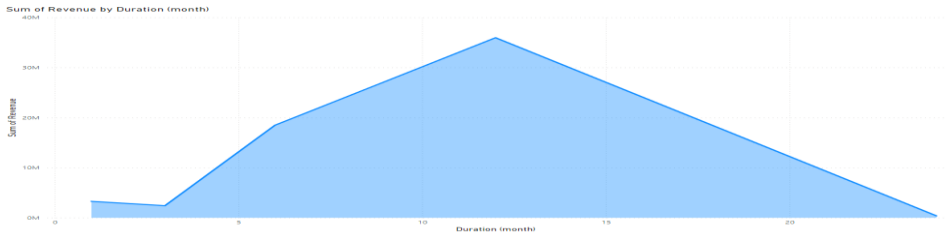
- Consulting Support Rate: 2.86

- Service Reliability Rate: 3.45

- Support Speed Rate: 3.01

The ratings indicate moderate customer satisfaction, with the highest scores in quality and service reliability.

1.2.4. Revenue by duration (month)



The correlation coefficient between the total revenue and duration (in months) is approximately 0.0097. This value indicates a very weak positive correlation between the two variables. In simpler terms, the duration of the product or service (in months) has a negligible influence on the total revenue generated.

Looking at the data:

- For a 1-month duration, the total revenue is $3,274,976.
- For a 3-month duration, it's $2,407,126.
- A significant jump is seen for a 6-month duration with $18,485,702 in revenue.
- The highest revenue is observed for a 12-month duration at $35,959,542.
- Finally, a 24-month duration shows a lower revenue of $385,921.

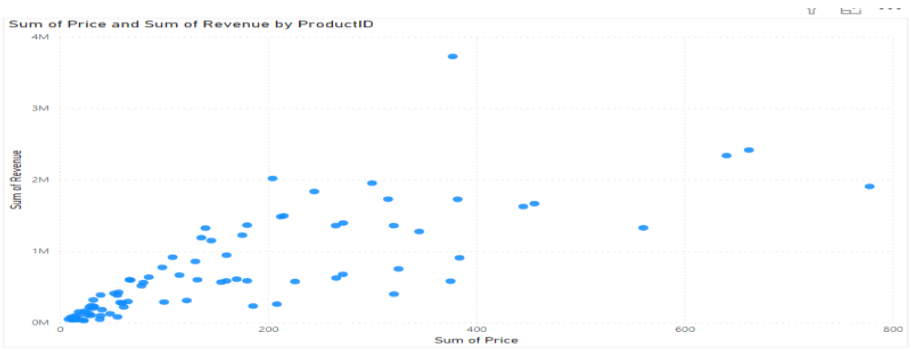
Interpretation:

- Low Correlation: The very low correlation suggests that the duration of the service or product is not a strong predictor of total revenue. This might mean that customers' purchasing decisions are influenced more by other factors like the nature of the product, its quality, price, or their specific needs rather than how long the service lasts.
- Revenue Distribution: The revenue peaks at the 12-month duration. This could indicate popular annual plans or subscriptions. However, the lower revenue for a 24-month duration suggests that fewer customers commit to longer-term plans.

Strategic Implications:

- Focus on Short to Medium Term Plans: Since there's a peak in revenue for 6 and 12-month durations, the company might benefit from focusing on these plans.
- Explore Customer Preferences: Investigate why longer-term plans (like 24 months) are less popular. This could involve customer surveys or market research.
- Customization and Flexibility: Offering customizable or flexible plans might be more appealing to customers, as the duration does not seem to be the key driving factor in revenue.

1.2.5. Price and revenue



The correlation coefficient between the total revenue and price is approximately 0.774, indicating a strong positive correlation. This suggests that as the price of products or services increases, the total revenue also tends to increase significantly.

Interpretation:

Strong Positive Relationship: The high correlation coefficient implies that higher-priced products or services are substantial contributors to the overall revenue. This can be due to either higher margins on these products or a customer base willing to pay more for certain offerings.

Premium Product Strategy: This finding might support a strategy focused on premium products or services, where higher prices do not significantly deter customers but rather contribute to a significant portion of the revenue.

Pricing and Value Perception: The correlation also suggests that customers may perceive higher value in higher-priced offerings, aligning with the common notion that price often correlates with quality in consumer perception.

Strategic Implications:

Focus on High-Value Offerings: The company could benefit from focusing on high-value or premium offerings that command higher prices, as these seem to be significant revenue drivers.

Market Segmentation: There may be a segment of the customer base that is less price-sensitive and more focused on the value or premium aspects of the products or services. Targeting marketing efforts towards this segment could be beneficial.

Review of Pricing Strategy: Given the strong correlation, revisiting the pricing strategy to ensure it aligns with the perceived value and market positioning of the products or services could help optimize revenue.

Balanced Portfolio: While focusing on higher-priced products is beneficial, maintaining a balanced portfolio that caters to various market segments is crucial to ensure broader market appeal.

1.2.6. Correlation Analysis

- There are mild correlations between the variables, with no strong direct relationships observed.

- The most notable correlations are a moderate negative correlation between 'Price' and 'Support Speed Rate', and a positive correlation between 'Consulting Support Rate' and 'Service Reliability Rate'.

Predictive Insights and Recommendations:

- Revenue Focus: Increase emphasis on Internet and Phone services, and products aimed at business/big families.
- Customer Satisfaction: Investigate lower-rated areas, especially consulting support and support speed, to improve overall satisfaction.
- Pricing Strategy: The lack of a strong correlation suggests that pricing strategies could be adjusted without significantly impacting quantity sold. Consider competitive pricing for products with lower sales.

- Trend Analysis: Further analyze the relationship between price and quantity sold to identify optimal pricing points for different products.

1.3. Churn Prediction Model Selection

In the model selection phase, we embarked on an exhaustive journey to identify the most effective algorithm for predicting customer churn within the telecom industry. After diligent preprocessing and tuning procedures, a suite of machine learning models was deployed, including but not limited to logistic regression, random forest, support vector machines, and LightBGM. Each model underwent rigorous evaluation using the F1-score metric, a key performance indicator in our context due to its ability to balance precision and recall.

model	accuracy	recall	fbeta	f1_score	precision
Gradient Boosting Classifier	0.776621	0.746881	0.761460	0.639695	0.559413
AdaBoost Classifier	0.760057	0.757576	0.758814	0.626382	0.533920
CatBoost Classifier	0.767629	0.761141	0.764371	0.634944	0.544643
Hist Gradient Boosting	0.758164	0.762923	0.760536	0.626189	0.531017
XGBoost	0.774728	0.748663	0.761473	0.638298	0.556291
LightGBM	0.763370	0.777184	0.770215	0.635569	0.537608

The results of this comprehensive evaluation revealed LightGBM as the standout performer, consistently demonstrating superior predictive capabilities compared to its counterparts. The LightBGM algorithm's remarkable ability to capture intricate relationships within the data, coupled with its ensemble nature, contributed to its exceptional performance in classifying customers at risk of churning. Notably, its adaptive boosting techniques and regularization mechanisms ensured a robust model capable of handling the complexities inherent in customer behavior prediction.

Beyond its top-tier F1-score, LightBGM’s feature importance analysis provided valuable insights into the drivers of churn within our dataset. This interpretability is crucial

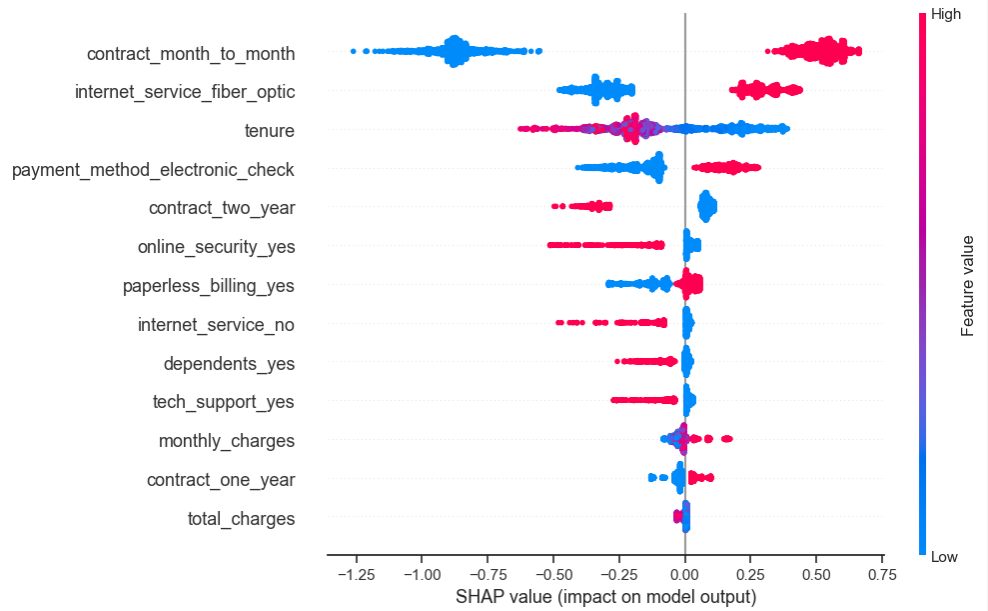
for stakeholders seeking a deeper understanding of the factors influencing customer attrition. The fine-tuning of hyperparameters, guided by both grid search and domain knowledge, further optimized the model's performance.

0	0.904	0.758	0.825	1552
1	0.538	0.777	0.636	561
accuracy			0.763	2113
macro avg	0.721	0.768	0.730	2113
weighted avg	0.807	0.763	0.775	2113

Ultimately, the decision to select LightBGM as our preferred model was not solely driven by its superior F1-score but also by its interpretability, robustness, and potential for providing actionable insights. This comprehensive approach to model selection ensures that our predictive framework is not only accurate but also aligns with the strategic goals of mitigating customer churn in the dynamic landscape of the telecom industry.

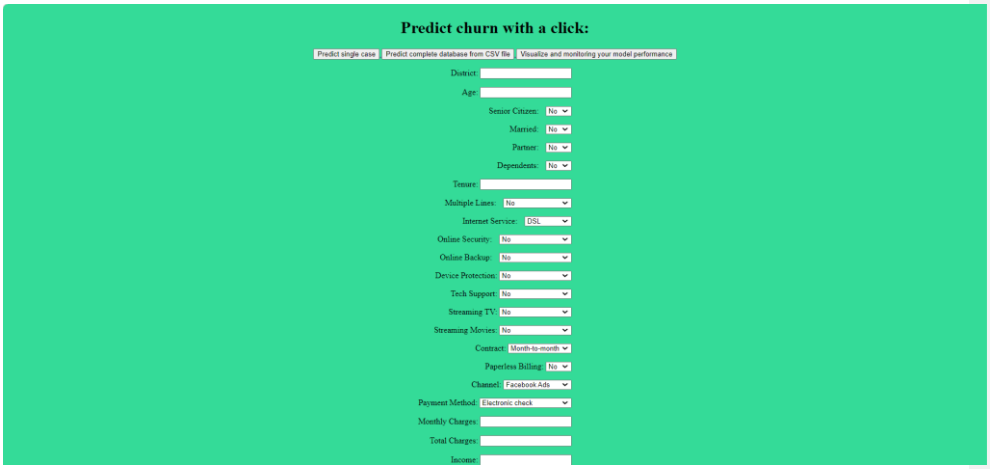
1.4. SHAP explainer

SHAP summary plot illustrating the impact of different features on a predictive model's output. Features that contribute to higher predictions (likely churn) are shown in red to the right, while features that contribute to lower predictions (likely retention) are shown in blue to the left. Month-to-month contracts and fiber optic internet services are the top influencers for higher churn likelihood, whereas longer tenure and not having internet service are associated with lower churn likelihood. Each dot represents a customer, with their position showing the influence of that specific feature on the churn prediction for them.



1.4. App Interface Development

After evaluation and interpretation of results, the complete model was saved on disk, to enable its integration into a REST API developed in Flask.



Now with the model saved, we can develop the API for the end user to consume all the predictive intelligence made available by the application and make data-based decisions to reduce customer retention costs.

To make this possible, logic was created behind the application that takes the churn probabilities for each customer and calculates them so that if the churn probability is greater than or equal to 0.7, the customer will receive a red alert flag and will be issued a prescription for the user to offer a package of discounts to try to keep them as a customer.

If the probability is less than 0.7 and greater than or equal to 0.5, the customer will receive a yellow alert and the user will be instructed to contact them to see if there is a problem that we can resolve.

And finally, if the probabilities are less than 0.5, the customer will receive a flag of not being a potential churn and the user will receive the message that the customer is satisfied with the company.

The API was developed entirely in Flask and HTML, it has two routes where the HOME page contains an interactivity where the user can request the churn prediction of a single customer at a time through crossing variables available in the application. And on the other page he can upload a complete database to predict whether different customers will leave the company or not.

1.5. Customer retention strategies

1.5.1. Streamlined Multi-Channel customer experience

Integrated CRM systems:

Implement a CRM system, tailored to ProTel's needs, that seamlessly integrates customer interactions across phone, online, and in-app channels. Utilize a platform like Salesforce or Zendesk to centralize customer data and queries, ensuring a unified and efficient support experience.

A customer initiates a service query via the ProTel app and then follows up with a phone call. The representative, armed with ProTel's integrated CRM system, has immediate access to the customer's app-based interaction history. This allows the representative to provide a seamless and informed response, demonstrating a deep understanding of the customer's journey and needs.

1.5.2. Enhanced internet services and technology solutions

Upgrade Fiber Optic Services:

Invest in upgrading ProTel's Fiber Optic services to improve reliability and speed.

Leverage advanced technology solutions to proactively address service issues, especially for high-value customers with multiple lines and streaming services.

ProTel enhances its Fiber Optic services, offering increased bandwidth and reliability. Additionally, ProTel implements predictive analytics to identify and address potential service disruptions before customers experience issues. This proactive approach enhances customer satisfaction and reduces the churn rate among Fiber Optic users.

1.5.3. Responsive customer feedback mechanism

Real-Time feedback integration:

Implement a real-time feedback mechanism within ProTel's customer touchpoints. Utilize customer feedback tools to gather insights promptly and act upon them to enhance service quality.

ProTel incorporates real-time feedback buttons within its app and website, allowing customers to provide instant feedback on their experiences. The feedback is integrated into ProTel's CRM system, enabling quick analysis and immediate action. This agile approach ensures that ProTel is responsive to customer concerns and continuously improves its services.

1.5.4. Customer service excellence

Specialized representative training:

Enhance the training program for ProTel's customer service representatives. Focus on product knowledge and customer empathy, addressing the diverse needs of ProTel's customer base, including those with dependents and senior citizens.

ProTel invests in specialized training modules for its customer service representatives, providing in-depth knowledge about all services and cultivating empathetic communication skills. Representatives are equipped to handle a diverse range of customer queries, ensuring a high standard of customer service that aligns with ProTel's commitment to excellence.

1.5.5. Tailored loyalty programs

Data-driven rewards:

Leverage ProTel's data analytics capabilities to design loyalty programs based on individual customer usage patterns. Offer personalized rewards that resonate with each customer segment.

ProTel analyzes customer usage patterns and introduces a loyalty program that offers personalized rewards. For example, heavy internet users receive bonus data, while frequent international callers enjoy discounts on their global calling rates. This tailored approach enhances the perceived value of loyalty programs and strengthens customer loyalty.

1.5.6. Proactive customer engagement

Automated contract renewal offers:

Implement automated systems to proactively engage customers nearing contract renewal, especially those on month-to-month plans. Personalize offers and service upgrades to incentivize contract extensions.

ProTel's automated system identifies customers approaching contract renewal. These customers receive personalized offers, such as discounted rates or additional service features, encouraging them to renew their contracts. This proactive engagement reduces the likelihood of churn among this customer segment.

1.5.7. Human-centric digital services

VIP support teams:

Introduce dedicated support teams within ProTel that provide personalized assistance, particularly for customers with high tenure or high monthly charges. Assigning VIP support representatives enhances the human touch in digital interactions.

ProTel establishes a VIP support team comprised of experienced representatives with an in-depth understanding of long-term customers' needs. These representatives provide personalized assistance, ensuring high-value customers receive an elevated level of service and attention.

1.5.8. Optimized digital presence

Targeted social media campaigns:

Refine ProTel's digital marketing strategies, focusing on targeted social media campaigns and search engine visibility. Engage customers who are influenced by online channels with content that aligns with ProTel's brand message.

ProTel conducts targeted social media campaigns highlighting its upgraded Fiber Optic services, personalized loyalty programs, and responsive customer support. The content is designed to resonate with the online audience, encouraging customer engagement and

positive brand interactions.

1.5.9. Content customization and engagement

Interactive content platforms:

Develop interactive content platforms within ProTel's app and website. Tailor content to specific customer segments, providing educational materials, promotions, and entertainment that align with their preferences.

ProTel introduces an interactive content section within its app, offering tutorials, promotions, and exclusive content based on customer preferences. For example, families receive content related to family-friendly services, creating a personalized and engaging experience.

1.5.10. Encouraging customer referrals

Referral rewards program:

Launch a customer referral program within ProTel, offering rewards to both the referrer and the new customer. Encourage word-of-mouth promotion by providing incentives for customers to share positive experiences.

ProTel introduces a referral rewards program where existing customers receive discounts or bonus services for successfully referring new customers. Simultaneously, new customers enjoy welcome bonuses, creating a win-win scenario that fosters organic growth through positive customer advocacy.

1.5.11. Improved digital user experience

User-friendly app and website:

Optimize ProTel's app and website for easy navigation and quick access to services. Implement user-friendly features that enhance the digital experience for tech-savvy customers.

ProTel revamps its app and website interface, incorporating user-friendly navigation and features such as one-click access to customer support. This optimization ensures a seamless digital experience, particularly for customers who prefer self-service and quick interactions.

1.5.12. Service quality and network improvement

Transparent communication:

Keep ProTel customers informed about network upgrades, such as the rollout of 5G. Utilize various communication channels to transparently share information and foster trust.

ProTel initiates a communication campaign, using email, SMS, and in-app notifications, to inform customers about the upcoming 5G network upgrade. The communication emphasizes the benefits and improvements, addressing potential concerns and building anticipation among customers.

1.5.13. Marketing automation for targeted campaigns

Automated personalized messaging:

Implement marketing automation tools to deliver personalized messages and promotions to specific customer segments, especially those identified as high-risk churn groups through data analysis.

ProTel utilizes marketing automation to send targeted messages to customers identified as high-risk churn candidates. These messages may include exclusive offers, personalized recommendations, or proactive solutions to potential issues. The automation ensures timely and relevant communication.

1.5.14. Continuous data-driven improvement

Data analytics dashboard:

Establish a centralized data analytics dashboard within ProTel to regularly analyze customer data. Utilize the insights gained to refine strategies, address emerging trends, and make data-driven improvements.

ProTel implements a comprehensive data analytics dashboard that tracks key performance indicators related to customer satisfaction, service usage, and churn rates. The dashboard provides real-time insights, enabling ProTel teams to make informed decisions and implement continuous improvements based on current data.

1.5.15. Customer segmentation and targeted strategies

Targeted customer approaches:

Develop tailored strategies for different customer clusters within ProTel based on tenure and charges. Customize communication, offers, and engagement tactics to address the

specific needs and concerns of each segment.

ProTel categorizes customers into distinct clusters based on their tenure and charges. For example:

- Cluster 0 (Low Tenure, High Charges): ProTel focuses on providing value and transparent pricing to address concerns about high charges.
- Cluster 1 (High Tenure, High Charges): ProTel offers loyalty rewards and premium services to acknowledge their long-term commitment.
- Cluster 2 (Low Tenure, Low Charges): ProTel engages these customers with introductory offers and educational content to build a stronger relationship.

To effectively reduce churn and retain customers at ProTel, these practical and detailed strategies need to be implemented with precision. It is crucial to tailor these strategies according to ProTel's unique business model, customer base, and market dynamics. Consider collaborating with industry experts, utilizing cutting-edge technologies, and continuously monitoring customer feedback and data analytics to ensure the success of these retention initiatives.

1.6. Marketing & Sales Campaigns Recommendations

Based on the insights, we develop a comprehensive marketing and sales plan for ProTel with detailing objectives, strategies, tactics, and evaluation metrics for each campaign:

1.6.1. "Connect More, Save More" Bundle Campaign

Objective:

Increase subscription to bundled services (phone, internet, TV) by 25% within the next 12 months.

Strategies and Tactics:

- Promotional Offers: Launch a limited-time offer for new and existing customers to upgrade to a bundle at a discounted rate.
- Targeted Marketing: Use customer data to identify potential customers for upselling and cross-selling bundled packages.
- Collaborative Advertising: Partner with popular streaming services or device

manufacturers for joint promotions.

Evaluation Metrics:

- Number of new bundle subscriptions.
- Uptake rate among targeted customer segments.
- Increase in average revenue per user (ARPU).

1.6.2. "Experience the Future" Fiber Optic Campaign

Objective:

Boost Fiber Optic subscriptions by 30% and reduce churn rate among Fiber Optic users by 15% within a year.

Strategies and Tactics:

- Customer Education: Develop educational content explaining the benefits of Fiber Optic technology.
- Experience Centers: Set up demo zones in retail locations where customers can experience the high-speed internet firsthand.
- Incentivized Upgrades: Offer existing DSL customers a free or discounted upgrade to Fiber Optic.

Evaluation Metrics:

- Number of customers upgrading to Fiber Optic.
- Reduction in churn rate for Fiber Optic customers.
- Customer feedback on service quality improvements.

1.6.3. "Family First" Plans

Objective:

Capture 20% more market share in the family segment over the next 18 months.

Strategies and Tactics:

- Family Plan Packages: Create tailored family plans offering shared data and additional lines at discounted rates.
- Family-Centric Marketing: Use channels like family blogs, parenting websites, and school newsletters for promotions.
- Referral Incentives: Offer additional benefits for family referrals.

Evaluation Metrics:

- Market share growth in the family segment.
- Number of family plans sold.
- Customer satisfaction scores from families.

1.6.4. "Tech-Savvy Support" Initiative

Objective:

Improve customer satisfaction scores by 30% and reduce complaint resolution time by 50% within one year.

Strategies and Tactics:

- Enhanced Training: Regularly train customer service representatives on new technologies and soft skills.
- Online Support Portals: Develop comprehensive online support resources including FAQs, forums, and how-to videos.
- Feedback System: Implement a real-time feedback system post customer interaction.

Evaluation Metrics:

- Reduction in average resolution time.
- Improvement in customer satisfaction and NPS scores.
- Decrease in repeat complaints.

1.6.5. "Go Green with ProTel" Paperless Campaign

Objective:

Convert 50% of customers to paperless billing within the next two years.

Strategies and Tactics:

- Incentivization: Offer a one-time discount or monthly bill credits for customers who switch to paperless billing.
- Awareness Campaigns: Run an eco-friendly campaign focusing on the environmental benefits of going paperless.
- Easy Enrollment: Ensure a hassle-free process for switching to paperless billing.

Evaluation Metrics:

- Percentage of customers using paperless billing.

- Reduction in paper billing costs.
- Customer feedback on the enrollment process.

1.6.6. "Refer and Earn" Referral Program

Objective:

Increase customer base by 15% through referrals over the next year.

Strategies and Tactics:

- Referral Rewards: Implement a reward system for customers who refer new customers.
- Promotional Material: Provide existing customers with easy-to-share referral links and promotional materials.
- Tracking System: Use a CRM tool to track referrals and ensure timely reward distribution.

Evaluation Metrics:

- Number of new customers acquired through referrals.
- Conversion rate of referral leads.
- Return on investment (ROI) of the referral program.

1.6.7. "First-Year Favorites" Onboarding Package

Objective:

Reduce first-year churn by 20% and improve customer satisfaction among new subscribers.

Strategies and Tactics:

- Welcome Offers: Create attractive introductory offers for the first year.
- Onboarding Communication: Send regular communication during the first year including tips, service information, and offers.
- First-Year Support: Provide dedicated support channels for new subscribers.

Evaluation Metrics:

- Churn rate among first-year customers.
- Customer satisfaction scores of new subscribers.
- Uptake of additional services within the first year.

1.6.8. "Secure Connection" Online Security Promotion

Objective:

Increase adoption of online security services by 40% within 18 months.

Strategies and Tactics:

- Security Packages: Develop comprehensive online security and backup packages.
- Educational Campaigns: Conduct workshops and webinars on the importance of online security.
- Trial Periods: Offer a free trial period for security services.

Evaluation Metrics:

- Uptake rate of online security services.
- Customer feedback on the perceived value of these services.
- Impact on overall customer loyalty and trust.

1.6.9. "ProTel Pulse" Community Engagement

Objective:

Build a loyal online community and increase customer engagement by 30%.

Strategies and Tactics:

- Online Forums and Groups: Create and manage online forums and social media groups.
- Community Events: Host both virtual and physical events like tech talks, family days, and workshops.
- User-Generated Content: Encourage customers to share their experiences and tips.

Evaluation Metrics:

- Growth in community membership and engagement.
- Customer participation in events and content sharing.
- Improvement in brand sentiment and loyalty.

1.6.10. "Loyal to ProTel" Loyalty Program

Objective:

Increase customer retention by 25% and ARPU by 10% within two years.

Strategies and Tactics:

- Loyalty Points System: Introduce a points-based system where customers earn rewards for payments, referrals, and contract renewals.

- Exclusive Benefits: Offer loyal customers exclusive perks such as early access to new features or priority support.

- Personalized Communication: Regularly communicate with loyal customers about their benefits and opportunities.

Evaluation Metrics:

- Retention rate among loyalty program members.
- Increase in ARPU among enrolled customers.
- Customer feedback on loyalty rewards and perks.

Implementation and Management:

- Each campaign should be managed by a dedicated team responsible for execution, monitoring, and adjusting strategies based on performance.

- Utilize marketing automation and analytics tools for efficient campaign management and measurement.

- Regularly review and adjust campaigns based on customer feedback, market trends, and performance data.

IV. Conclusion

The "Customer Churn Analytics" project for ProTel Inc. represents a significant step towards understanding and addressing the challenges of customer retention in the highly competitive telecom sector. Through meticulous data collection, feature analysis, and the development of predictive models, the project has laid a solid foundation for ProTel Inc. to enhance its customer engagement and retention strategies.

Our churn prediction models have provided insightful revelations into the factors contributing to customer turnover. By analyzing features like service usage patterns, customer demographics, and satisfaction ratings, we have identified critical areas where ProTel Inc. can implement targeted interventions to improve customer loyalty and reduce churn.

The retention strategy recommendations developed in this project are designed to be both innovative and practical, ensuring that they resonate with ProTel Inc.'s diverse customer base. These strategies, ranging from personalized service offerings to enhanced customer

support, are not just solutions to current challenges but also investments in long-term customer relationships.

Additionally, the user-friendly interface developed as part of this project is a testament to our commitment to making data-driven insights accessible and actionable for decision-makers at ProTel Inc. This interface is a crucial tool for continuously monitoring customer sentiment and churn risk, thereby enabling proactive customer retention efforts.

As we conclude this project, it is important to acknowledge that the landscape of customer expectations and technology is ever-evolving. Therefore, we recommend that ProTel Inc. maintains an agile and adaptive approach. Continuous monitoring of the market, regular updates to predictive models, and the willingness to innovate in customer service and engagement strategies will be key to staying ahead in the competitive telecom industry.

In summary, the "Customer Churn Analytics" project has provided ProTel Inc. with valuable insights and tools to enhance its customer retention strategies. The project's findings have the potential not only to reduce churn rates but also to foster a more loyal and satisfied customer base, ultimately contributing to the sustainable growth of ProTel Inc.