FACULTY OF COMPUTING
UTM Johor Bahru

UNIVERSITI TEKNOLOGI MALAYSIA

SUBJECT CODE	:	**MCSD1013**
SUBJECT NAME	:	**BUSINESS INTELLIGENCE AND ANALYTICS**
SECTION	:	**01**
TIME	:	
DATE/DAY	:	**16 JUNE – 27 JUNE 2024**
VENUES	:	

INSTRUCTIONS:

This alternative assessment is an INDIVIDUAL assessment consists of **FOUR(4)** questions/phases:

1) Data preparation
2) Dashboard development and data story telling
3) Analytics based on identified business problem
4) Reporting
   Each student will be evaluated based on ALL the questions/phases given
   (Please attach this page as the front page of your report)
5) Submission to be done through E-learning

(Please Write Your Lecturer Name And Section In Your Answer Booklet)

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Year / Course	4/ Software Engineering
Section	01
Lecturer Name	Dr. Nor Erne Nazira Bazin

This question paper consists of **SEVEN (7)** printed pages excluding this page.

1. Introduction

The goal of this project is to analyze customer churn and engagement to help businesses retain their customers and enhance satisfaction. Using a comprehensive dataset from Kaggle, which includes detailed customer information such as demographics, usage patterns, and support interactions, we aim to identify the key factors driving churn and develop predictive models. This analysis will provide valuable insights for managers and decision-makers, enabling them to implement strategies that reduce churn rates, improve customer engagement, and optimize business performance. By bridging the gap between data analysis and practical implementation, this project seeks to support the sustainable growth and overall health of businesses.

1.1. Business Problem

Company X is experiencing customer churn, impacting revenue and long-term business sustainability. The Sales Team lacks comprehensive insights into customer behaviours and preferences, hindering their ability to effectively mitigate churn and enhance customer retention strategies.

1.2. Stakeholder

The primary stakeholders for the customer churn analysis project are the members of the Sales Team at Company X. This team plays a vital role in the company's revenue generation and customer relationship management efforts. Using the insights from the customer churn analysis, the Sales Team can make data-driven decisions to improve customer retention, enhance engagement, and ultimately boost sales performance. By focusing on the Sales Team as the primary stakeholders and aligning the BI analysis with their needs, Company X can significantly enhance its ability to retain customers, improve sales performance, and achieve sustainable growth.

1.3. Goals and Objectives

Goals

- Reduce customer churn rate within the next fiscal year.
- Enhance customer engagement and satisfaction levels.

- Optimize sales performance and resource allocation.
- Improve overall business health and achieve sustainable growth.

Objectives
- Identify key factors contributing to customer churn through data analysis.
- Develop targeted interventions to retain customers at high risk of churning.
- Understand customer needs and preferences through detailed analysis of customer demographics and behaviours.
- Personalize interactions with customers to strengthen relationships and increase satisfaction.
- Utilize data-driven insights to make informed decisions about sales strategies.
- Identify and focus on effective sales strategies for customer retention.
- Implement data-driven approaches to reduce revenue loss associated with churn.
- Align BI analysis with Sales Team needs to enhance customer retention strategies.

2. Preparation of Data

For the project we have used 2 different datasets. Both the datasets are named "Customer Churn Dataset", also has almost same columns. But the entries for the datasets are completely different. Dataset one has about 65

2.1. Dataset 1

For this project, we utilized a comprehensive customer churn dataset available on Kaggle, titled "Customer Churn Dataset." This dataset encompasses various aspects of customer information crucial for understanding and predicting customer churn. This rich dataset provides a detailed view of customer behaviours, interactions, and demographic information, making it ideal for analysing the factors that lead to customer churn. Through this dataset, we aim to develop predictive models and gain insights into customer retention strategies to reduce churn rates and enhance overall business performance

Columns: CustomerID, Age, Gender, Tenure, Usage, Frequency, Support Calls, Payment Delay, Subscription Type, Contract Length, Total Spend, Last Interaction, and Churn.

Source: https://www.kaggle.com/datasets/muhammadshahidazeem/customer-churn-dataset?select=customer_churn_dataset-testing-master.csv

2.2. Dataset 2

We utilized an additional customer churn dataset available on Kaggle, also titled "Customer Churn Dataset." This dataset includes vital customer information necessary for understanding and predicting customer churn. This comprehensive dataset provides a detailed view of customer behaviours, interactions, and demographic information, making it ideal for analysing the factors that lead to customer churn.

Columns: CustomerID, Age, Gender, Tenure, Usage, Frequency, Support Calls, Payment Delay, Subscription Type, Contract Length, Total Spend, Last Interaction, and Churn.

Source: https://www.kaggle.com/datasets/muhammadshahidazeem/customer-churn-dataset?select=customer_churn_dataset-training-master.csv

2.3.Cleaning of the Data

1. **Rename column**: Changed the name of the columns wherever required to keep accordance to the project. For example changed Contract Length, Subscription Type to Contract and Subscription respectively

2. **Change Types**: According to the necessity of the dashboard creation some of the columns data types were changed. For example, CustomerID type was changed to whole number from text, Churn was changed from text and many more. .

3. **Promote Headers**: Renamed the headers of the datasets accordingly so that meaningful analysis can be done.

4. **Remove Columns**: After thorough and careful review some unnecessary columns were removed to perform the completion of insightful analysis.

5. **Replace Values**: Replaced the values where necessary. For instance, replaced the data of Churn column, from yes, no to 0,1 merged both the datasets accordingly to same names.

6. **Checking duplicated columns**: Checked for duplicated columns in both the datasets but couldn't find any.

7. **Check and removal of null values**: Checked for null values within the columns then removed whole rows with blank or null values.

PROPERTIES

Name

customer_churn_dataset-1

All Properties

APPLIED STEPS

Source	⚙
Promoted Headers	⚙
Renamed Columns	
Changed Type	
Removed Columns	
✕ Removed Blank Rows	

PROPERTIES

Name

customer_churn_dataset- 2

All Properties

APPLIED STEPS

Source	⚙
Promoted Headers	⚙
Changed Type	
Renamed Columns	
Removed Columns	
Renamed Columns1	
Removed Blank Rows	
Changed Type1	
Replaced Value	⚙
Replaced Value1	⚙
✕ Removed Blank Rows1	

PROPERTIES

Name

Merge1

All Properties

APPLIED STEPS

Source	⚙
Expanded customer_churn_da...	⚙
Removed Columns	
Changed Type	
Replaced Value	⚙
Replaced Value1	⚙
Removed Blank Rows	
Removed Errors	
Removed Blank Rows1	
Removed Blank Rows2	
Removed Blank Rows3	
Changed Type1	
Removed Blank Rows4	
Filtered Rows	⚙
Replaced Value2	⚙
Replaced Value3	⚙
Replaced Value4	⚙
Changed Type2	
✕ Filtered Rows1	⚙

2.4. Merged Dataset

Table name: Merge1

Column	Data Type	Description
CustomerID	Whole Number	Unique identifier for each customer.
Age	Whole Number	Age of the customer
Gender	Text	The gender of the customer.
Tenure	Text	The number of months the customer has been with the company.
Usage	Text	The amount of service usage by the customer.
Frequency	Text	How often the customer uses the service
Support Calls	Text	The number of support calls made by the customer
Payment Delay	Text	Incidents of payment delays by the customer
Subscription Type	Text	The type of subscription the customer has.
Contract Length	Text	The length of the customer's contract.
Total Spend	Text	The total amount spent by the customer.
Churn (0,1)	Binary	Whether the customer has churned or not. If 0 then not, of 1 then yes

3. Dashboard Development and Story Telling

3.1. Churn Dashboard
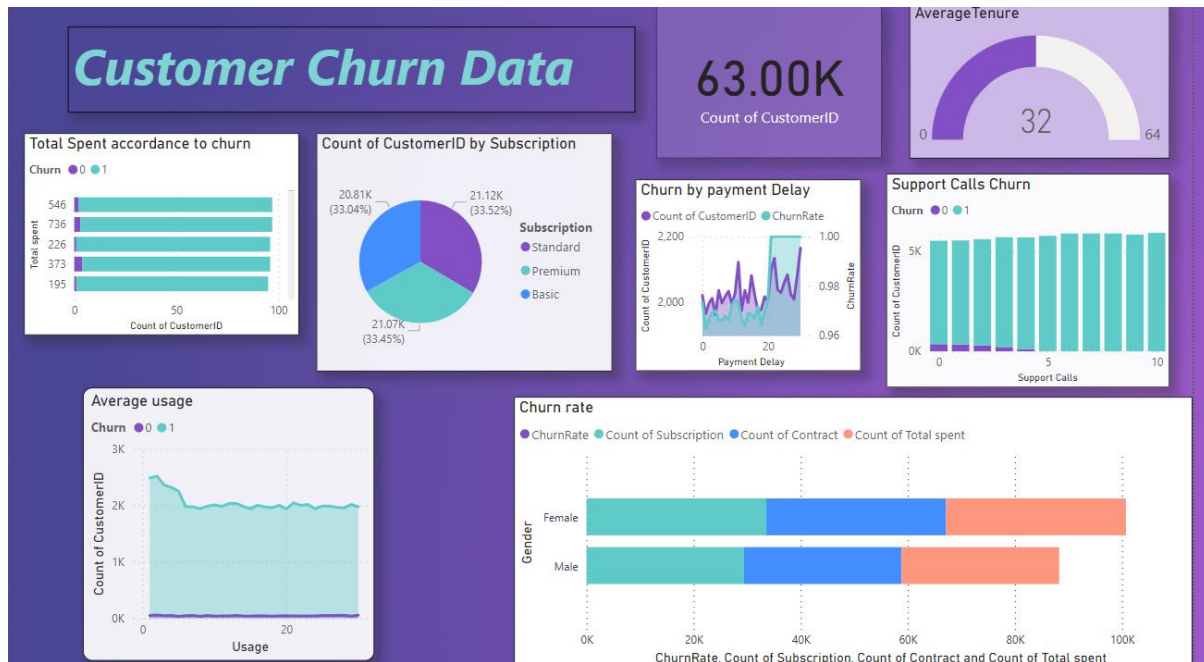
3.2. Story Line

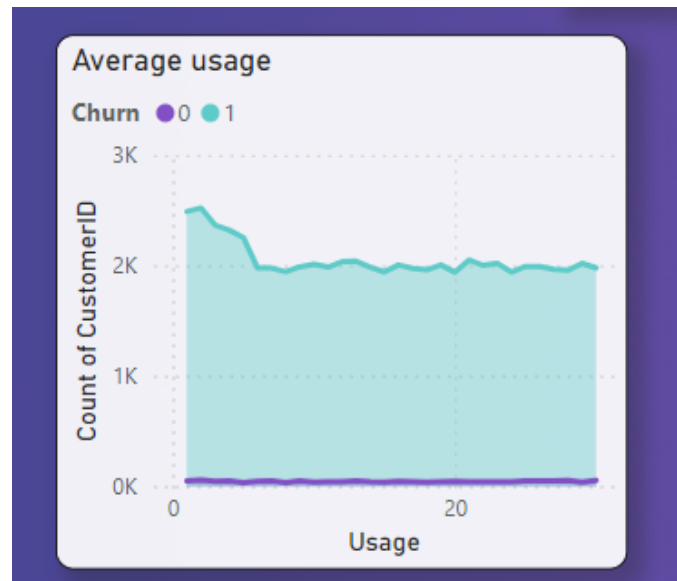1. **Churn Rate:** Presents a comprehensive view of churn rates across various segments
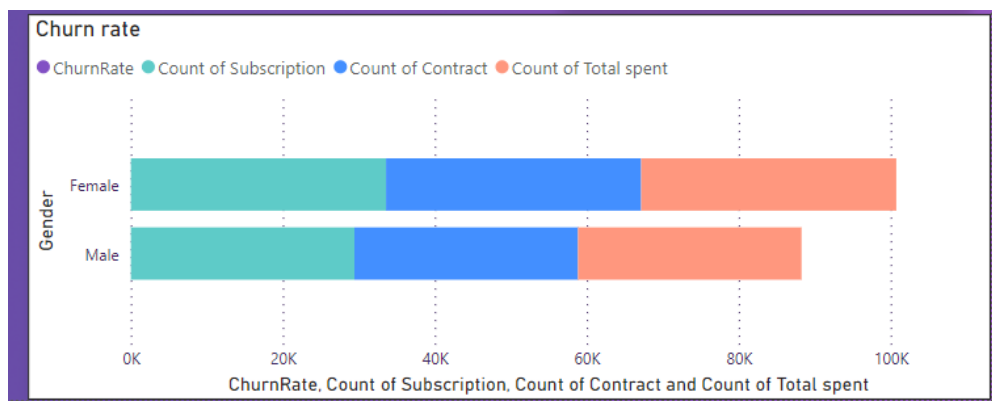
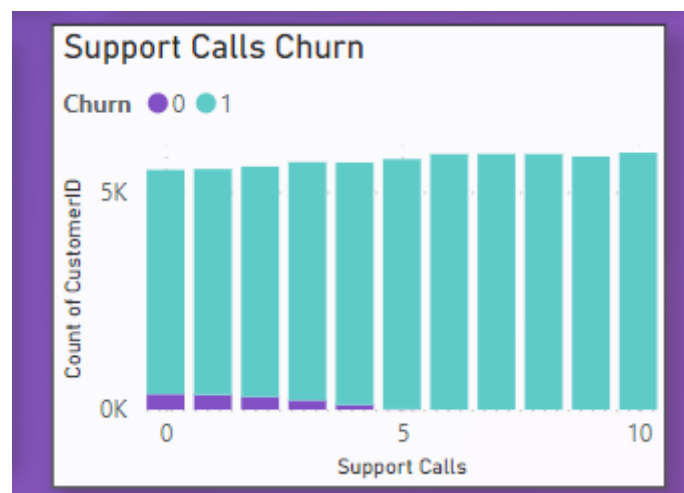2. **Average Tenure:** Shows the average tenure for the Users
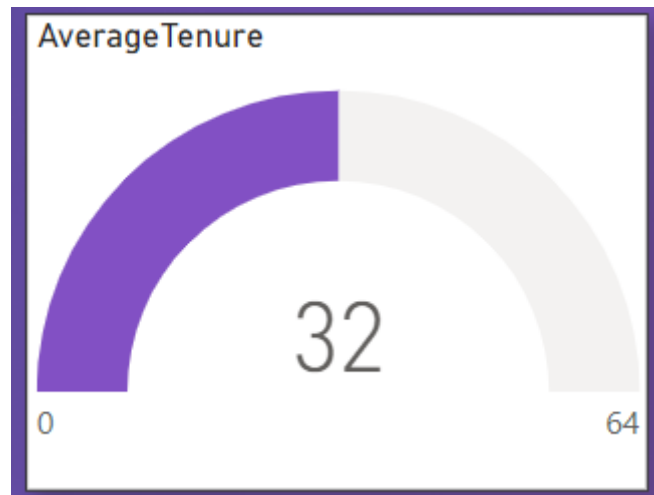
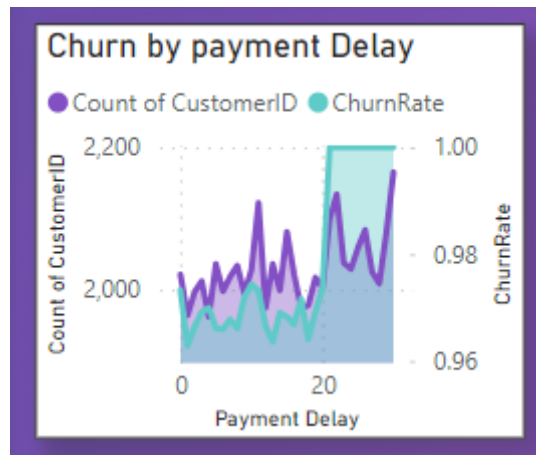3. **Total Spend Accordance to Churn:** Presents the churn of customers along with the money spent by them
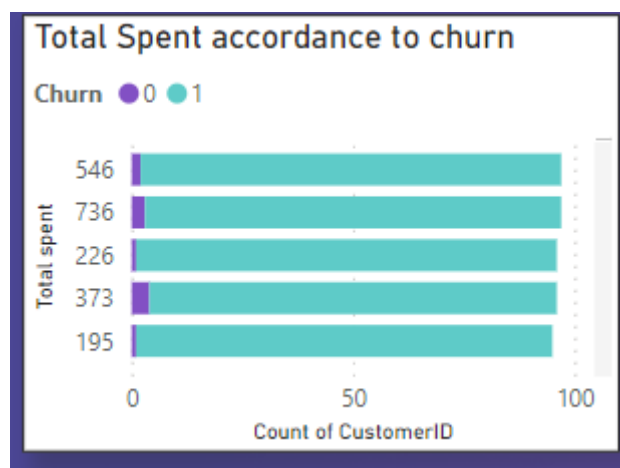
4. **Average Usage:** Depicts the Customers' usage along with their rate of Churn
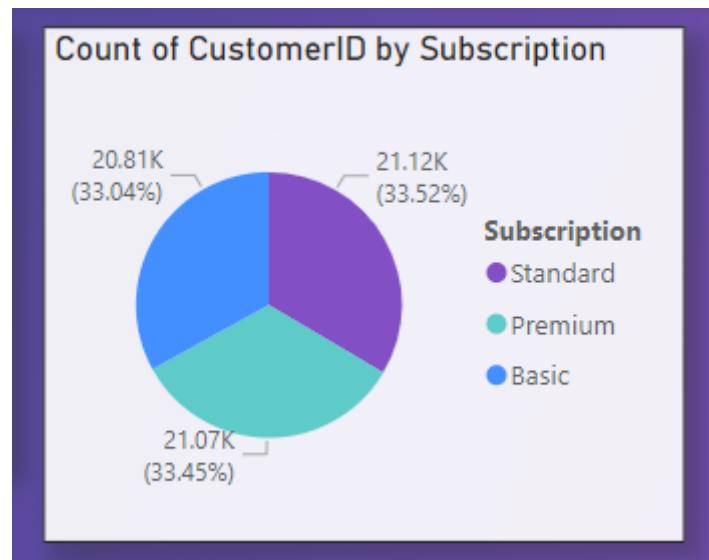
5. **Support Calls Churn:** Presents the churn of customers in accordance to the number of support calls

6. **Churn by Payment Delay:** Depicts the Churn rate for the payment delays

7. **CustomerId by Subscription:** Shows the different Subscription amongst the customers

4. Prediction

The predictive analysis in this project aimed to forecast customer churn and identify key factors contributing to it, providing actionable insights for improving customer retention. Utilizing a comprehensive dataset, we focused on crucial attributes such as age, gender, tenure, usage, total spend, support calls, payment delay, subscription type, contract length, and churn. Data preparation involved cleaning, handling missing values, and encoding categorical variables to ensure readiness for analysis.
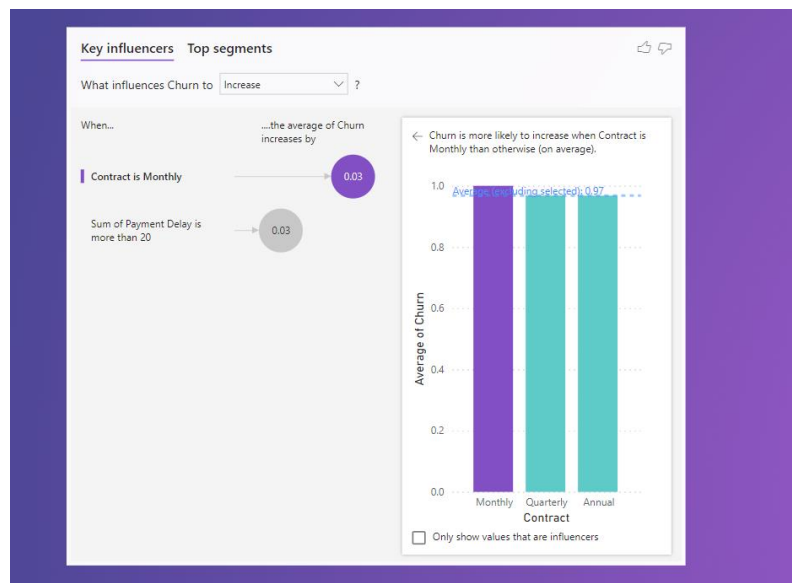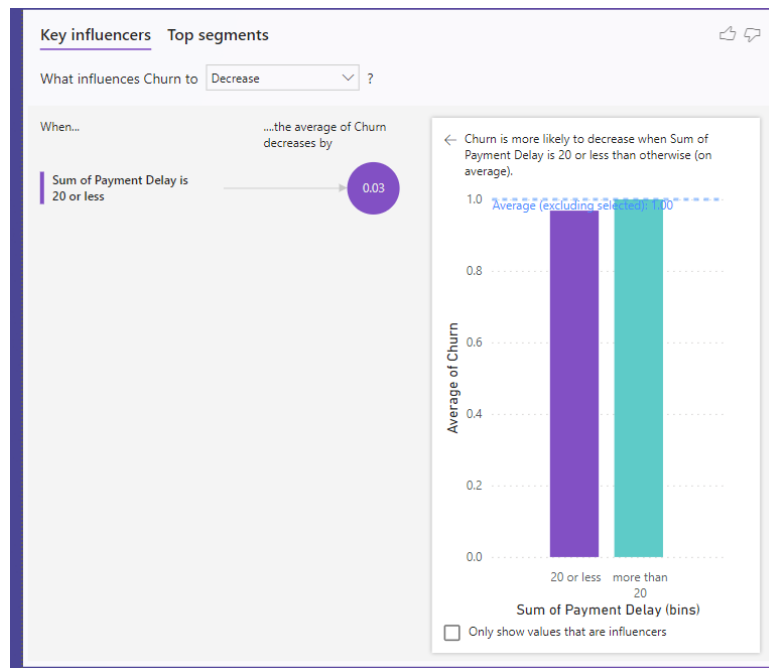
We employed Power BI's Key Influencers visual to identify significant factors influencing churn, revealing that high usage and frequent support calls were strong indicators of potential churn. This insight enables businesses to target high-usage customers and improve customer support to reduce churn rates.. The best-performing model was integrated back into Power BI for real-time predictions, enhancing the dashboard's functionality. By leveraging these predictive insights, businesses can implement targeted strategies to retain at-risk customers, optimize customer engagement, and ultimately achieve sustainable growth. The combination

of Power BI provided a robust approach to predictive analysis, ensuring comprehensive and actionable insights for stakeholders.
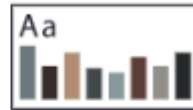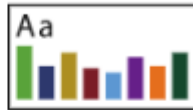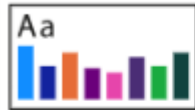

5. Visualization

The visuals chosen for this report were designed to fit with the "Bloom" theme in Power BI, which uses soft pastel colours and light backgrounds. This makes the report look pleasing and easy to understand.
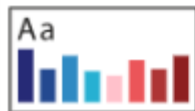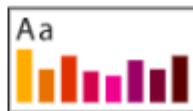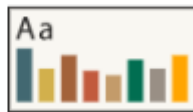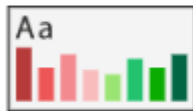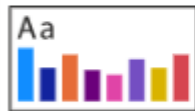
The red marked theme is the chosen one

The colors in the "Bloom" theme are gentle and blend nicely together. They help to show different parts of the data clearly without being too flashy. This makes it simple for anyone reading the report to see the important information.

Each chart or graph in the report has a specific job to do. They use the colors from the Bloom theme to highlight the main ideas and trends in how customers leave or stay with the service. By using soft colors and keeping things simple, the visuals help people see what's happening with the data. This makes it easier to make smart decisions about how to keep customers happy and coming back.

Using the Bloom theme's style helps to make all the visuals in the report fit together nicely. It makes the data look clear and interesting, which helps people understand it better. This way, the report isn't just informative but also looks good and makes sense to everyone reading it.

6. Insights from the Dashboard

The dashboard provides valuable insights into the dynamics of customer churn and engagement. Users can explore various aspects of customer behaviour and their relationship to churn through a series of interactive visualizations.

The **Area Chart for Average Usage** reveals that higher usage levels are correlated with lower churn rates, indicating that customers who use the service more frequently are less likely to leave. This suggests that increasing customer engagement through usage can be an effective strategy for reducing churn.

In the **Bar Chart for Total Spend**, we see that customers with higher total spend tend to have lower churn rates. This could imply that customers who invest more in the service find greater value and are more satisfied, thereby reducing their likelihood of leaving.

The **Stacked Column Chart for Number of Support Calls** highlights that customers who make frequent support calls have a higher churn rate. This suggests that improving customer support services and resolving issues more efficiently could potentially lower churn rates.

Payment behaviour is analysed in the **Area Chart for Payment Delays**. The data indicates that customers with frequent payment delays are more likely to churn. This insight underscores the importance of addressing payment issues promptly and possibly offering more flexible payment options to retain customers.

The **Pie Chart for Subscription Types** shows the distribution of different subscription types among customers. It highlights that certain subscription types have lower churn rates, providing an opportunity to promote these more stable options to at-risk customers.

Finally, the **Clustered Bar Chart for Churn Rates** presents a comprehensive view of churn rates across various segments. This chart reveals significant differences in churn rates based

on demographics, usage patterns, and subscription types, providing a nuanced understanding of the factors influencing churn.

Overall, the dashboard serves as a powerful tool for analyzing and visualizing customer behavior and churn. The insights gained can inform strategies to enhance customer engagement, improve support services, and ultimately reduce churn rates. By leveraging these insights, the business can optimize its retention strategies, ensuring sustained growth and improved customer satisfaction.

7. Discussion on how the proposed BI solutions can assist the stakeholder in decision-making

In this section, we explore practical recommendations derived from our analysis to enhance customer retention and satisfaction. These suggestions are aimed at stakeholders that is the members of the Sales Team at Company X who can implement strategies based on our findings

Enhancing Customer Engagement
- *Increase Personalization* by using customer data to personalize interactions and offers, making customers feel valued and understood.
- *Improve Communication Channels* by enhancing communication through multiple channels (e.g., email, SMS, app notifications) to keep customers informed and engaged.
- *Promote Loyalty Programs* by introducing or enhancing loyalty programs to reward long-term customers and encourage repeat business.

Improving Support Services
- *Streamline the Support Processes* by optimizing customer support systems to reduce response times and resolve issues more efficiently.
- Provide *regular training* for support staff to ensure they have the skills and knowledge to handle customer queries effectively.

- Implement mechanisms to gather *customer feedback* regularly, using insights to continuously improve support services.

Addressing Payment Issues

- Offer *flexible payment plans* and methods to accommodate diverse customer preferences and financial situations.
- Implement *automated reminders* for upcoming payments to reduce instances of payment delays.
- Introduce *incentives or discounts* for customers who consistently make timely payments.

Enhancing Product and Service Offerings

- Conduct *regular market research* to understand evolving customer needs and preferences.
- Continuously *innovate products* and services based on customer feedback and market trends.
- *Monitor Competitors* by keeping track of their offerings and adjust strategies to maintain a competitive edge in the market.

Utilizing Predictive Analytics

- Develop and utilize *predictive models* to forecast customer behaviour and identify at-risk customers before they churn.
- Launch *targeted marketing campaigns* based on predictive insights to re-engage and retain customers.

Cultivating Positive Customer Relationships

- Prioritize delivering exceptional *customer experiences* at every touchpoint.
- *Build Trust and Transparency* by being transparent about policies, pricing, and service quality.
- Acknowledge and celebrate *customer milestones* (e.g., anniversaries, loyalty milestones) to strengthen relationships.

Monitor and Evaluate

- Define and monitor KPI (*Key Performance Indicator*) related to customer retention, satisfaction, and churn rates.
- Conduct *regular reviews* and evaluations of implemented strategies to assess their effectiveness and make necessary adjustments.

By taking the above recommendations into account the proposed BI solutions can assist the stakeholder in decision-making. This can contribute to reducing churn rates, enhancing customer satisfaction, and ultimately improving overall business performance. By focusing on the data-driven insights, stakeholders can foster long-term customer loyalty and sustainable growth.