

Part 1

A1. Please see both data sets attached in the submission.

A2. Your Comprehensive Walkthrough for Dashboard Installation: Step-by-Step Guide:

1. Visit the official Tableau website to download Tableau Desktop:
<https://www.tableau.com/products/desktop/download>
2. Follow the on-screen instructions to install Tableau Desktop on your computer
3. Obtain the Tableau workbook file from the D211 submission
4. Save the downloaded workbook file to a location on your computer
5. Launch Tableau Desktop on your computer
6. In Tableau Desktop, go to the "File" menu and select "Open"
7. Navigate to the location where you saved the downloaded the Tableau workbook file and open it
8. Interact with the Dashboard: Explore the dashboard interactively by clicking on elements, filters, and tooltips to analyze and explore the data

A3. Navigating the Dashboard: Step-by-Step Guide:

Throughout the dashboard, you will find various charts, graphs, and interactive elements. Click on different elements to explore additional details and insights and utilize tooltips that provide context and information when hovering over specific data points.

1. Drilling down Based on City - If user wants to drill down for further detailed insights based on the selected city:
 - a. Select the city of interest on the map.
 - b. Observe how the dashboard adjusts to focus on insights related to the highlighted city.
 - c. Once the city is selected, information regarding the customers' churn reasons, customers' satisfaction, and customers' assigned area based on population size will appear.
 - d. To reset the dashboard, unselect the city.
2. Select an Area
 - a. Locate the "Area Filter" on the right side of the dashboard.
 - b. Click on the drop-down menu and choose the desired area from the list.
 - c. Observe how the entire dashboard dynamically updates to display insights specific to the selected area.

These step-by-step instructions guide users through interacting with the area filter, highlighting cities, and drilling down into specific insights based on the city selected.

A4. SQL Code used to support data and dashboard creation.

To create table for external data:

```
CREATE TABLE cali_cust(  
"Customer ID" VARCHAR(256) NOT NULL,  
City VARCHAR(256) NOT NULL,  
"Zip Code" INTEGER NOT NULL,
```

```
Latitude NUMERIC NOT NULL,  
Longitude NUMERIC NOT NULL,  
Population INTEGER NOT NULL,  
CLTV INTEGER NOT NULL,  
"Churn Reason" VARCHAR(256) NOT NULL,  
"Customer Satisfaction" VARCHAR(256) NOT NULL,  
State VARCHAR(256) NOT NULL  
);
```

To import external data into created table:

```
COPY cali_cust  
FROM 'C:\Users\Public\Documents\telco_churn_data_clean.csv'  
DELIMITER ','  
CSV HEADER;
```

To join all tables required and export joined data in one csv file used to build dashboard:

```
COPY (SELECT *  
FROM customer AS c  
INNER JOIN location AS l  
ON c.location_id = l.location_id  
INNER JOIN cali_cust AS ca  
ON ca.state = l.state  
WHERE l.state = 'CA')  
TO 'C:\Users\Public\Documents\combined_ca_data.csv'  
DELIMITER ','  
CSV HEADER;
```

In text citations:

("Filtering and sorting", n.d.)
("What's in the database?", n.d.)
("Column types and constraints", n.d.)
("Numeric data types and summary functions", n.d.)
(Stack Overflow, 2018)
(PostgreSQLTutorial.com, n.d.)
(W3Schools, n.d.)

Part 2

Please see the Panopto video link in submission.

Part 3

C1.

Purpose and Function of the Dashboard: The primary purpose of the dashboard is to enable executive leaders (SVP, EVP, and Regional VPs) to explore telecommunications churn data, identify trends, and

compare key metrics. The function is to provide actionable insights that support decision-making related to customer engagement, recruitment, retention, and regional operations.

Alignment with Data Dictionary: The data dictionary outlines various categories of information available in the dataset, such as customer demographics, interaction details, and geographic information. The dashboard's purpose aligns with the available data by focusing on key characteristics of customers, their behavior, and geographic information.

Specific Considerations for Each Leader:

- **Customer Experience (SVP):** The dashboard highlights key characteristics that make up a customer and may drive their behavior, such as the 'Insights into Customer Churn Reasons'. Emphasis on insights related to customer engagement with the company's products and services are also within the dashboard.
- **EVP of Sales:** The dashboard provides a broad categorization of customers and demonstrate how these demographics play out across different cities. Insights such as the 'Customer Lifetime Valuation' could support strategic recruitment and renewal sales efforts.
- **Regional VPs:** The dashboard can assist in setting policies and managing operations in respective areas. Considerations for promotions or new product features being rolled out across areas can be derived from dashboard insights.

User-Friendly Design: Recognizing that some of the audience may lack a technical data analysis background, the dashboard should be easy to navigate. The dashboard is intended to present broad and understandable insights relevant to each leader's perspective.

Key Dashboard Features: Interactive controls such as filters should facilitate exploration of trends and metrics. Also, the visualizations should be tailored to represent customer interaction patterns and regional variations.

In summary, the purpose and function of the dashboard align with the needs outlined in the data dictionary by focusing on key customer-related metrics. The design and content cater to the specific requirements of executive leaders with varying areas of expertise, ensuring that the dashboard provides actionable insights relative to their decision-making processes.

C2.

Selecting Tableau as a business intelligence tool, is the best solution for this assignment for the following reasons:

1. **User-Friendly Interface** – Tableau is intuitive and has a user-friendly interface, making it accessible to users with varying levels of technical expertise. This ease of use allows for quick adoption and implementation within a business environment.
2. **Data Visualization Capabilities** – Tableau is a great data visualization tools, offering a wide range of interactive and dynamic charts, graphs, and dashboards. This feature is crucial for businesses aiming to derive actionable insights from their data through visual representation.
3. **Connectivity and Integration** – Tableau provides connectors for a wide range of data sources including popular relational databases (such as MySQL and PostgreSQL), spreadsheets, and

cloud-based platforms. Its ability to integrate with various data storage systems ensures that businesses can analyze and visualize data from multiple sources seamlessly.

4. Scalability – Tableau can handle varying scales of data analysis. Furthermore, Tableau provides a comprehensive set of data analysis functions, enabling users to perform complex calculations, statistical analysis, and create calculated fields to derive meaningful insights from raw data.
5. Collaboration and Sharing – The tool facilitates collaboration through features like interactive dashboards and the ability to share visualizations and reports easily.

C3.

Steps to clean and prepare data for analysis:

1. Removed Unnecessary Columns:

In the initial phase of data preparation, unnecessary columns were identified and removed manually within Excel. This involved the removal of columns that were deemed redundant and/or irrelevant to the analysis. The following columns were removed: Referred a Friend, Number of Referrals, Tenure in Months, Offer, Phone Service, Average Monthly Long Distance Charges, Multiple Lines, Internet Service, Internet Type, Average Monthly GB Download, Online Security, Online Backup, Device Protection Plan, Premium Tech Support, Streaming TV, Streaming Movies, Unlimited Data, Contract, Paperless Billing, Payment Method, Monthly Charge, Total Regular Charges, Total Refunds, Total Extra Data Charges, Total Long Distance Charges, Gender, Age, Under 30, Senior Citizen, Married, Dependents, Number of Dependents, Churn Value, Churn Category, and Total Customer Svc Requests. This process streamlined the dataset for better focus and improved efficiency.

2. Handling Missing Data:

Missing data poses challenges to the integrity of the analysis. To address this, missing customer satisfaction scores were systematically filled with 0's. This decision was made to avoid potential biases in the analysis while acknowledging the absence of explicit satisfaction scores. The systematic use of 0's reflects a neutral approach, treating the missing values as being missing at random and unrelated to the specific satisfaction scores. Similarly, missing customer churn reasons were filled with "non" creating a standardized category for cases where customers did not provide reasons for churn. This categorization is done in a way of handling missing information without guessing or assuming reasons for customer churn, maintaining the assumption that the missing data is at random rather than following a distinct pattern. These methods ensure a fair treatment of missing values without introducing systematic biases into the analysis.

3. Excel to CSV Conversion

To conduct a smooth importation process into pgAdmin, the dataset was converted from Excel format to CSV. This conversion ensured compatibility and maintained data integrity during the transition. It allowed for a more standardized data format for seamless integration into the PostgreSQL database.

4. Data Importation into pgAdmin

The cleaned and formatted data was imported into pgAdmin. This process involved using PostgreSQL query to import CSV file.

5. Joining Customer Table to Location Table

To refine the dataset, the customer table was joined with the location table. This join was based on the location_id common key that was in both tables and aimed to incorporate geographical information into the analysis. The resulting dataset provided insights into the geographical distribution of customers within the context of the churn database.

6. Joining External Data to Location Table

Further refinement was achieved by joining the external data with the location table. This step focused on isolating customers in California. By filtering for customers in this specific region, the analysis honed in on a targeted subset of data, facilitating a more region-specific examination of churn-related trends.

7. Combining Data Through Inner Joins and Filtering

Inner joins and strategic filtering were applied to combine the various datasets seamlessly. This process involved aligning datasets based on common identifiers and applying filters to ensure that only relevant data was retained. Through these operations, the combined dataset emerged, capturing the essential variables and relationships necessary for analysis.

8. Exporting Combined Data

The finalized and refined dataset, resulting from inner joins and filtering, was exported into a single CSV file. This exportation ensured that the combined data was readily available for utilization in dashboard creation. The choice of CSV format aimed at maintaining compatibility with Tableau, fostering a smooth transition from data preparation to visualization.

By executing these steps, the data was cleaned, transformed, and prepared for analysis.

C4.

Steps for dashboard creation:

1. Geographical analysis – Initiated the dashboard creation by developing a sheet that reviews average data across various cities in California using a geographical map. This map provides a visual representation of a key metric, fostering an understanding of geographical trends.
2. Churn Reason analysis – Utilized a bar chart to analyze customer churn reasons based on area classification (urban, suburban, or rural). This chart offers insights into the predominant reasons for customer churn in different areas, aiding in pinpointing common issues.
3. Customer Lifetime Valuation – Developed a bar chart to assess customer lifetime valuation across different areas. This analysis aims to identify which geographic area contributes the most value to telecommunication companies, offering strategic insights for business decisions.
4. Dashboard Integration – Subsequently, all individual sheets were integrated to form a cohesive dashboard. This step ensures a consolidated view of multiple aspects, allowing for a

comprehensive analysis of geographical patterns, customer churn reasons, and customer lifetime valuation in one centralized location.

5. Geographical Filter – A filter was then implemented on the geographical map to enhance interactivity. This filter allows users to change the ensure dashboard dynamically by clicking on a specific city on the map, providing a more granular and localized view of the data.
6. Area-Based Filter – Lastly, an area filter was introduced to enhance user control and customization. This filter enables users to modify the dashboard based on the selected area, facilitating a more focused and targeted analysis according to urban, suburban, and rural classifications.

These steps contribute to the creation of a comprehensive and interactive dashboard, allowing users to explore and understand key metrics related to geographical trends, customer churn reasons, and customer lifetime valuation in a user-friendly and visually appealing manner.

C5.

The outcomes of the analysis offer valuable insights for executive decision-making. Notably, rural areas emerge with the highest customer lifetime valuation, indicating a strategic opportunity for tailoring retention initiatives to this demographic. Concurrently, the analysis identifies competitor's superior devices as a primary churn factor, emphasizing the need for executives to consider product enhancements and competitive strategies. Los Angeles stands out with the highest yearly average data usage, suggesting a tech-savvy market, enabling executives to design targeted marketing campaigns and service offerings for this metropolitan area. Moreover, the differences between the rural and suburban areas in Los Angeles call for strategic differentiation. While retaining focus on customer satisfaction and retention in rural regions, efforts in suburban areas can be directed towards maintaining and potentially elevating customer lifetime valuation. These insights collectively guide executives in formulating comprehensive strategy that addresses unique challenges and capitalizes on localized opportunities, enhancing the effectiveness of strategic initiatives across diverse market segments.

C6.

The data analysis presented was subject to several limitations. Firstly, the completeness of customer information is crucial, and any gaps or missing data could have introduced biases. The accuracy and quality of the data are also vital, as inaccuracies or inconsistencies might compromise the validity of the results. Additionally, the geographical analysis, while providing valuable localized insights within specific area of California, may not fully represent broader regional or national trends. The categorization of customers and demographic insights, while valuable, might oversimplify complex factors influencing customer behavior. Furthermore, although the analysis identifies competitor devices as a significant churn factor, the data lacks detailed information on competitors' strategies, pricing models, devices, and other variables. Lastly, while the analysis establishes correlations between variables, caution is needed in inferring causation without additional methodologies such as experimental design. Acknowledging these limitations is essential for maintain transparency and offering a balanced interpretation of the data analysis results.

In-text citations:

("Mapping your data", n.d.)

("Make your data visually appealing", n.d.)

("Dashboards and stories", n.d.)
("Building a KPI dashboard", n.d.)
("Dashboards objects and actions", n.d.)
("Dashboard interactivity", n.d.)
("Sharing data insights", n.d.)
("Handling missing data", n.d.)

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