**A: DATA DASHBOARDS**

A copy of the dashboard is included in my submission under the filename ‘Combined Telecom Churn Dashboard’. The filetype is a Tableau Packaged Workbook (.twbx).

**A1: DATASETS AND DASHBOARD FILE**

Copies of the datasets I used in this PA can be located at these links:

WGU Churn – <https://access.wgu.edu/ASP3/aap/content/f9tjr8djg83jd8c3sdf8.zip>

Kaggle External Dataset - <https://www.kaggle.com/datasets/barun2104/telecom-churn>

**A2: DASHBOARD INSTALLATION**

A separate copy of instructions will be included in my submission in the form a .docx file, but I will also include all the steps to satisfy the report requirement. All 74 steps are as follows:

**pgAdmin Portion**

1) Open pgAdmin 4

2) Navigate to top-left and click on Servers, then PostgreSQL 16, then Databases, then churn.

3) Within churn, click on Schemas, then public, then Tables

4) Navigate to the toolbar on the top and click on Tools > Query Tool

5) A blank query space will open up and within it type the following SQL queries:

-- Create competitor table

CREATE TABLE public.competitor

(

Churn int NOT NULL,

AccountWeeks int NOT NULL,

ContractRenewal int NOT NULL,

DataPlan int NOT NULL,

DataUsage float NOT NULL,

CustServCalls int NOT NULL,

DayMins float NOT NULL,

DayCalls int NOT NULL,

MonthlyCharge float NOT NULL,

OverageFee float NOT NULL,

RoamMins float NOT NULL

);

6) Highlight and right-click on the newly created competitor table and click on the Import/Export data tool.\*\*\*

7) Navigate to the external csv file location and select it

8) Make sure csv is what appears in the Format field

9) Click on the Options tab and make sure OID is toggled off, Header is toggled on, and Delimiter is specified to ','.

10) Quote field should display " and Escape display '.

11) Click on the Columns tab and make sure NOT Null columns says 'Not null columns...'

12) Columns to import should include churn, accountweeks, contractrenewal, dataplan, datausage, custservcalls, daymins, daycalls, monthlycharge, overagefee, roammins.

13) Click OK on the bottom right and importation from csv to the competitor table should be successful

14) As a precaution, right-click on tables and hit Refresh after importation.

15) Next, run the following query to preview/check our imported data:

-- Run this query to check for successful table creation after using Import/Export data tool

SELECT\*

FROM competitor

LIMIT 50;

\*\*\* If an error message appears and does not allow copying/importing from the external csv file, please do the following:

Go to Properties of that particular file by right clicking on it. Then, go to Security tab of the displayed Properties dialog box. Click on Edit option. Permissions dialog box appears, then click on Add button. Type 'Everyone' (without apostrophes) in the "Enter the object names to select" description box and click on OK button. Then, make sure all the checkboxes of "Permissions for Everyone" are selected by just ticking the "Full Control" check box to allow the control access without any restriction. Then, Apply and OK all the tabs to apply all the changes done.

You can now run/execute the query without any errors.

**Tableau Prep Portion**

16) Open Tableau Prep Builder 2024.3

17) Click on Connect to Data and navigate and click on PostgreSQL

18) Check the following and ensure that Server is localhost, Port is 5432, Database is churn, Authentication to Username and Password, and Username postgres and Password filled in with 'Passw0rd!'.

19) Click on Sign In

20) Click on the customer table on the lower left hand pane and drag it into the Add Data canvas in the center of the workspace

21) Click on the plus sign that appears to the right and select +Clean Step in the Add dropdown.

22) Click on the Clean 1 that appears in the flow and navigate to the customer\_id column in the middle, not the bottom, and hover over it until three dots appear.

23) Click on those 3 dots and click on Remove.

24) Repeat the process in step 23 for the remaining following columns: lat, lng, population, children, age, income, marital, gender, outage\_sec\_week, email, yearly\_equip\_faiure, techie, port\_modem, tablet, job\_id, payment\_id, contract\_id, location\_id,

25) Navigate to tenure and click on the three dots and go to Create Calculated Field > Custom Calculation. Name the Field Name as Account\_Age

26) In the calculation field type the following: 'ROUND([tenure],1)'.

27) Click Apply and then click on Save

28) Remove the tenure column similar to how we removed columns earlier in steps 22-24.

29) Rename churn column to Churn by selecting the three dots that appear after hovering and select Rename Field, type Churn, and hit Enter.

30) Repeat steps 25-26 methods and rename monthly\_charge column to Monthly\_Charge with the following Custom Calculation applied: ROUND([monthly\_charge],1).

31) Remove the monthly\_charge column using steps 22-24 methods.

32) Apply steps 25-27 methods to bandwidth\_gp\_year column by naming it to Yearly\_Data\_Usage with the following Custom Calculation applied: ROUND([bandwidth\_gp\_year], 2).

33) Remove the bandwidth\_gp\_year column similar to how we removed columns earlier in steps 22-24.

34) Rename contacts column to TechSupport\_Calls\_Monthly by selecting the three dots that appear after hovering and select Rename Field, type TechSupport\_Calls\_Monthly, and hit Enter.

35) In the Flow pane at the top, hover over the Clean 1 name and double click to rename it to WGU Clean Flow and hit Enter.

36) Follow the same method in 35 and rename the customer table in the flow data pane to WGU Telecom and hit Enter.

37) Next, left-click and drag the competitor table into the flow pane.

38) Click on the plus sign and add a Clean Step.

39) Follow the method in Step 35 to rename the competitor table to Competitor Telecom and rename the Clean 1 flow to Competitor Clean Flow.

40) Use steps 22-24 to Remove the following columns: contractrenewal, dataplan, daymins, daycalls, overagefee, roammins.

41) Follow the methods in steps 25-28 to rename the churn column to Churn with the following Custom Calculation applied:

CASE [churn]

WHEN 1 THEN "Yes"

WHEN 0 THEN "No"

END

42) Remove the churn column by following the methods in steps 22-24.

43) Follow the methods in steps 25-28 to rename the accountweeks column to Account\_Age with the following Custom Calculation applied: ROUND(([accountweeks]\*0.230137), 1).

44) Remove the accountwweeks column by following the methods in steps 22-24.

45) Follow the methods in steps 25-28 to rename the datausage column to Yearly\_Data\_Usage with the following Custom Calculation applied: ROUND(([datausage]\*12),2).

46) Remove the datausage column by following the methods in steps 22-24.

47) Rename the custservcalls column to TechSupport\_Calls\_Monthly by following the methods in step 34.

48) Rename the monthlycharge column to Monthly\_Charge by following the methods in step 34.

49) Click on the Competitor Clean Flow and drag it up to the left side of the WGU Clean Flow until a box named Union appears. Release the left-click while continuing to hover over the Union box, ensuring that it highlights a tint of red while doing so.

50) A new flow named Union 1 should appear. Rename it to WGU & Competitor Telecom Churn Union using the methods in Step 35. Next, Remove the Table Names column by using the methods in Steps 22-24.

51) Click on the plus sign next to WGU & Competitor Telecom Churn Union and click on Output.

52) Left click on Output and in the pane near the lower left, rename Output to WGU & Competitor Telecom Churn Union, make sure Save output to is File AND click on the browse button to change the save location to Desktop, keep the Output type to Tableau Data Extract (.hyper)

53) Click on Run Flow on the bottom left-hand corner and click on Done in the center once it's finished to close the dialogue box. Also, save the flow by navigating to the toolbar and clicking on File > Save As. Name the file WGU & Competitor Telecom Churn Union Flow and save to Desktop or an easily accessible location.

**Tableau Desktop Portion**

54) Launch Tableau Desktop

55) Navigate to the left pane and click on More... under the To a File category.

56) A file explorer windows will open. Navigate to the location of the Tableau Flow we saved to Desktop earlier under the name 'WGU & Competitor Telecom Churn Union'.

57) Once you have located that file, click on it to select and click on Open in the dialogue box.

58) On the bottom left corner, right click on Sheet 1 and rename it to Churn Distribution and hit Enter.

59) In the Tables pane on the left, click and drag Churn into the Color Mark and Extract (Count) into the Label Mark.

60) Next, go to the Show Me button on the upper right and select the pie chart (second row, far right visual).

61) Drag Churn into Label Mark and Extract (Count) into Label Mark.

62) Within the Marks are, right click on CNT(Extract) as the Label Mark and navigate the drop down that appears and click on Quick Table Calculation > Percent of Total. Change the view from Standard to Entire View by navigating to the arrow in the top-middle portion of the toolbar. Finally, go to the top right legend that says CNT (Extract) and click on the drop down arrow on the right and click on Hide Card.

63) Click on the New Work Sheet on the bottom left and rename it to Yearly Data Usage

64) Drag Yearly Data Usage into Columns and again into Rows and in the Show Me portion, select the Histogram visual.

65) Double Click on the x-axis label Yearly Data Usage(bin) and locate the Axis Titles section and rename it to Yearly Data Usage and exit out of the dialogue box when done. Do the same for the y-axis label to rename it to Frequency

66) Follow the same steps from 63-65, except name the worksheet Account Age and rename the x and y-axes Account Age and Frequency, respectively.

67) Again, follow steps 63-65, except name the worksheet Monthly Tech Support Calls and rename the x and y-axes Monthly Tech Support Calls and Frequency, respectively.

68) Yet again, follow steps 63-65 except name the worksheet Monthly Charge and rename the x and y-axes Monthly Charge and Frequency, respectively. Additionally, create another new Worksheet and name it Averages. Then, drag Account Age, Monthly Charge, TechSupport Calls Monthly, and Yearly Data Usage into the Text box within the Marks pane. All of these may default to SUM as the measure. Individually click on each of these to open the dropdown and navigate to Measure and change it to Average. Finally, in the Show Me section, select the text tables visual type to display all four averages. The rows should say Measure Names and the Text Marks should display Measure Values

68) Click on Create New Dashboard on the bottom portion and rename it Customer Metrics.

69) Change the Size to Generic Desktop.

70) Click from the Sheets pane at the top left and Drag Churn Distribution into the empty space first, then drag Yearly Data Usage next into the dashboard pane and have it occupy the right half of the space.

71) Click and drag on the Account Age sheet and have it occupy the lower left quadrant

72) Next, click on Monthly Tech Support Calls and have it occupy the lower right quadrant of the dashboard space. Next, click on Monthly Charge and place it to the right of Churn Distribution. Then, Click on Averages and place it under the Churn legend on the far right side of the dashboard.

73) Navigate to the toolbar and go File > Save As and name the file Combined Telecom Churn Dashboard and change the Save as Type to Tableau Packaged Workbook (\*.twbx). Make sure the folder location is Desktop or somewhere easily accessible.

74) Navigate to the location where you saved the Combined Telecom Churn Dashboard file and double-click on it to open it in Tableau Desktop to verify and/or view the dashboard.

**A3: DASHBOARD NAVIGATION**

The Customer Metrics Dashboard is quite simple and contains histograms for Monthly Charge, Yearly Data Usage, Account Age, and Monthly Tech Support Calls. These histograms simply show the distribution of these individual metrics. The x-axes show the value for that variable in bins while the y-axes show the frequency that these variables appear. A pie chart is also present showing the percentage distribution of those that churned (Yes), compared to those that did not churn (No). The far top right contains the color legend for the pie chart. Underneath the pie chart is a text table showing the average values for the 4 variables that have their individual histograms.

**A4: SQL CODE**

This code will also be included in a separate .docx file but for the purposes of the PA report requirements is also listed below:

-- Create competitor table

CREATE TABLE public.competitor

(

Churn int NOT NULL,

AccountWeeks int NOT NULL,

ContractRenewal int NOT NULL,

DataPlan int NOT NULL,

DataUsage float NOT NULL,

CustServCalls int NOT NULL,

DayMins float NOT NULL,

DayCalls int NOT NULL,

MonthlyCharge float NOT NULL,

OverageFee float NOT NULL,

RoamMins float NOT NULL

);

-- Run this query to check for successful table creation after using Import/Export data tool

SELECT\*

FROM competitor

LIMIT 50;

Between the first query and the second query, I used the Import/Export data function within pgAdmin to copy the data from the external csv file.

**B: PANOPTO PRESENTATION**

The link to my Panopto presentation is located at the following link:

<https://wgu.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=dd1985c1-21e0-4dff-a543-b280002fba78>

**C1: DASHBOARD ALIGNMENT**

The purpose of this dashboard was to aggregate data from a competitor/external source and combine it with our own data regarding customer churn to have a better representation of the telecom customer population. Most other approaches would present the data in an oppositional way with the local data compared to the external data. I believe that discovering trends and insights with in-house data is already very useful by itself, however, having a representation of data that is more accurate to the entire population can give a more complete picture of how a certain industry is performing. Ultimately, this can give better opportunities to keep existing customers satisfied and possibly add new subscriptions if certain services can be tailored to be attractive to the consumers

**C2: BUSINESS INTELLIGENCE TOOL**

The business intelligence tool used for this analysis is Tableau. This tool is one of the best for this type of analysis due to its numerous feature sets and ease of use. One notable strength of Tableau is its ability to link with many data sources such as databases contained in pgAdmin/PostgreSQL. This ability makes it very simple to combine numerous sources of data, which is critical in analyses such as churn.

**C3: DATA CLEANING**

Tableau Prep was used to clean the data once the external data was imported into a newly created competitor table within pgAdmin. Creation of the competitor table in pgAdmin was done via a SQL Query and Importation from csv file was done through the Import tool within pgAdmin. Following this, Tableau Prep was linked to pgAdmin so that data cleaning can take place. Data cleaning in Tableau Prep mostly involved dropping irrelevant columns and renaming/recalculating variables so that uniformity is achieved between the customer table which has already been provided and my external dataset. Once cleaning was completed, a UNION was performed between both the customer table and the external competitor table within Tableau Prep. This workflow was then output to a flow file and a Tableau extract file. The Tableau extract file (.hyper) was opened within Tableau Desktop where the dashboard creation took place.

**C4: DASHBOARD CREATION**

Tableau Desktop was used to create the dashboards by opening and loading the Tableau extract (.hyper) file created in Tableau Prep. The following steps are the exact same ones mentioned in an earlier section and included in the separate Dashboard Creation Guide:

54) Launch Tableau Desktop

55) Navigate to the left pane and click on More... under the To a File category.

56) A file explorer windows will open. Navigate to the location of the Tableau Flow we saved to Desktop earlier under the name 'WGU & Competitor Telecom Churn Union'.

57) Once you have located that file, click on it to select and click on Open in the dialogue box.

58) On the bottom left corner, right click on Sheet 1 and rename it to Churn Distribution and hit Enter.

59) In the Tables pane on the left, click and drag Churn into the Color Mark and Extract (Count) into the Label Mark.

60) Next, go to the Show Me button on the upper right and select the pie chart (second row, far right visual).

61) Drag Churn into Label Mark and Extract (Count) into Label Mark.

62) Within the Marks are, right click on CNT(Extract) as the Label Mark and navigate the drop down that appears and click on Quick Table Calculation > Percent of Total. Change the view from Standard to Entire View by navigating to the arrow in the top-middle portion of the toolbar. Finally, go to the top right legend that says CNT (Extract) and click on the drop down arrow on the right and click on Hide Card.

63) Click on the New Work Sheet on the bottom left and rename it to Yearly Data Usage

64) Drag Yearly Data Usage into Columns and again into Rows and in the Show Me portion, select the Histogram visual.

65) Double Click on the x-axis label Yearly Data Usage(bin) and locate the Axis Titles section and rename it to Yearly Data Usage and exit out of the dialogue box when done. Do the same for the y-axis label to rename it to Frequency

66) Follow the same steps from 63-65, except name the worksheet Account Age and rename the x and y-axes Account Age and Frequency, respectively.

67) Again, follow steps 63-65, except name the worksheet Monthly Tech Support Calls and rename the x and y-axes Monthly Tech Support Calls and Frequency, respectively.

68) Yet again, follow steps 63-65 except name the worksheet Monthly Charge and rename the x and y-axes Monthly Charge and Frequency, respectively. Additionally, create another new Worksheet and name it Averages. Then, drag Account Age, Monthly Charge, TechSupport Calls Monthly, and Yearly Data Usage into the Text box within the Marks pane. All of these may default to SUM as the measure. Individually click on each of these to open the dropdown and navigate to Measure and change it to Average. Finally, in the Show Me section, select the text tables visual type to display all four averages. The rows should say Measure Names and the Text Marks should display Measure Values

68) Click on Create New Dashboard on the bottom portion and rename it Customer Metrics.

69) Change the Size to Generic Desktop.

70) Click from the Sheets pane at the top left and Drag Churn Distribution into the empty space first, then drag Yearly Data Usage next into the dashboard pane and have it occupy the right half of the space.

71) Click and drag on the Account Age sheet and have it occupy the lower left quadrant

72) Next, click on Monthly Tech Support Calls and have it occupy the lower right quadrant of the dashboard space. Next, click on Monthly Charge and place it to the right of Churn Distribution. Then, Click on Averages and place it under the Churn legend on the far right side of the dashboard.

73) Navigate to the toolbar and go File > Save As and name the file Combined Telecom Churn Dashboard and change the Save as Type to Tableau Packaged Workbook (\*.twbx). Make sure the folder location is Desktop or somewhere easily accessible.

74) Navigate to the location where you saved the Combined Telecom Churn Dashboard file and double-click on it to open it in Tableau Desktop to verify and/or view the dashboard.

**C5: DATA ANALYSIS RESULTS**

Results of this analysis show a general overview of the telecom population and indicate that a high percentage (76.5%) of telecom customers did not churn. The histograms also show somewhat of a bimodal distribution for Monthly Charge, Yearly Data Usage, and Account Age. Monthly Tech Support Calls were mostly nonexistent with most customers making zero calls to tech support. Due to the bimodal distribution of data, an inference could possible be made in that customers are either using too little or too much of their services and are either underpaying or overpaying for their subscriptions. The former is beneficial to the customer, however, to the telecom company lies the potential of missed profit. Therefore, better service and pricing optimizations could be the solutions to these observed trends.

**C6: ANALYSIS LIMITATIONS**

A limitation of this data stems from the fact that the competitor data was aggregated with our local data as opposed to a comparison type of analysis. Therefore, framing the data in this way makes it impossible to compare metrics between our data and the competitor. However, the benefit lies in obtaining a greater representation of churn trends and other metrics within the telecom customer population.

**D: WEB SOURCES**

No external web sources were used in this PA.

**E: SOURCES**

No external sources were used in this PA.