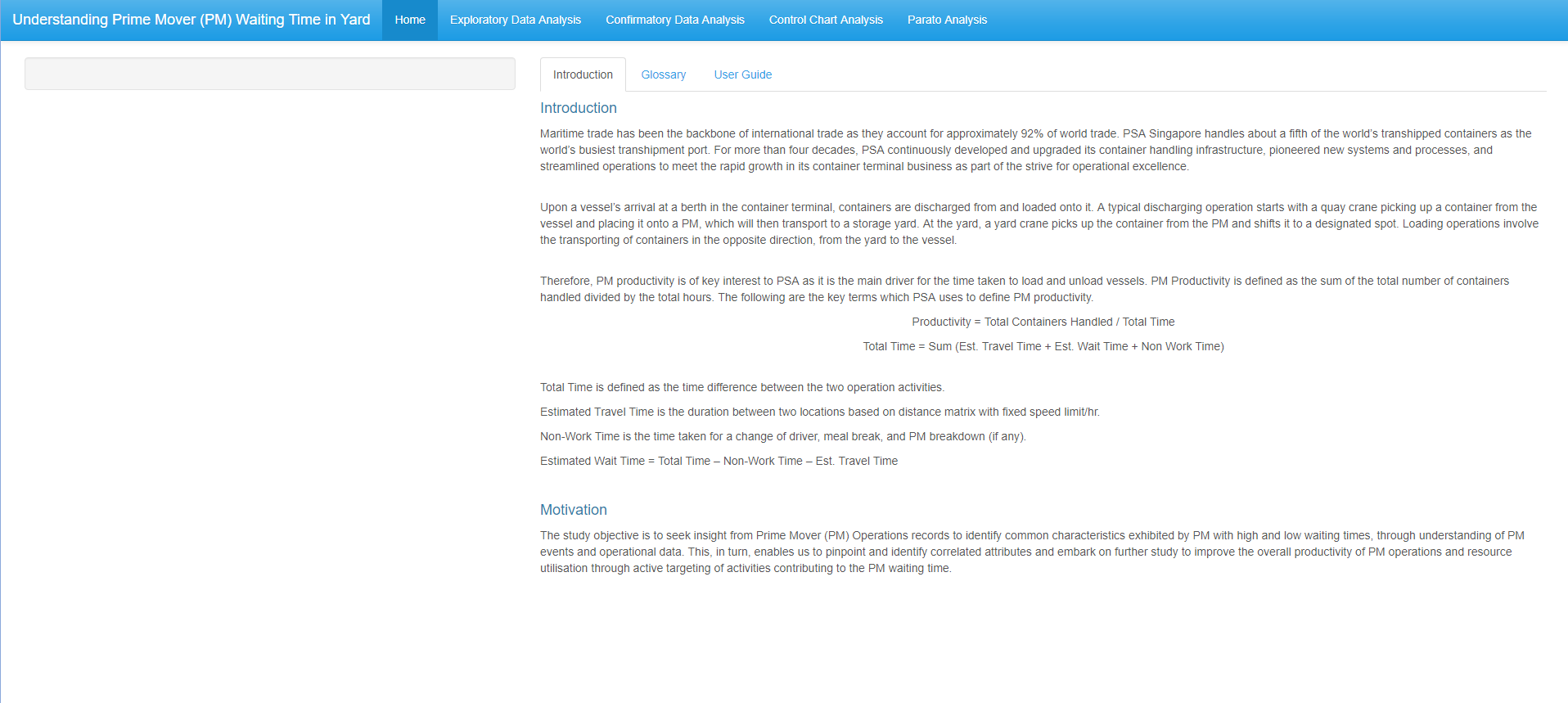
**User Guide – Understanding Prime Mover (PM) Waiting Time in Yard**

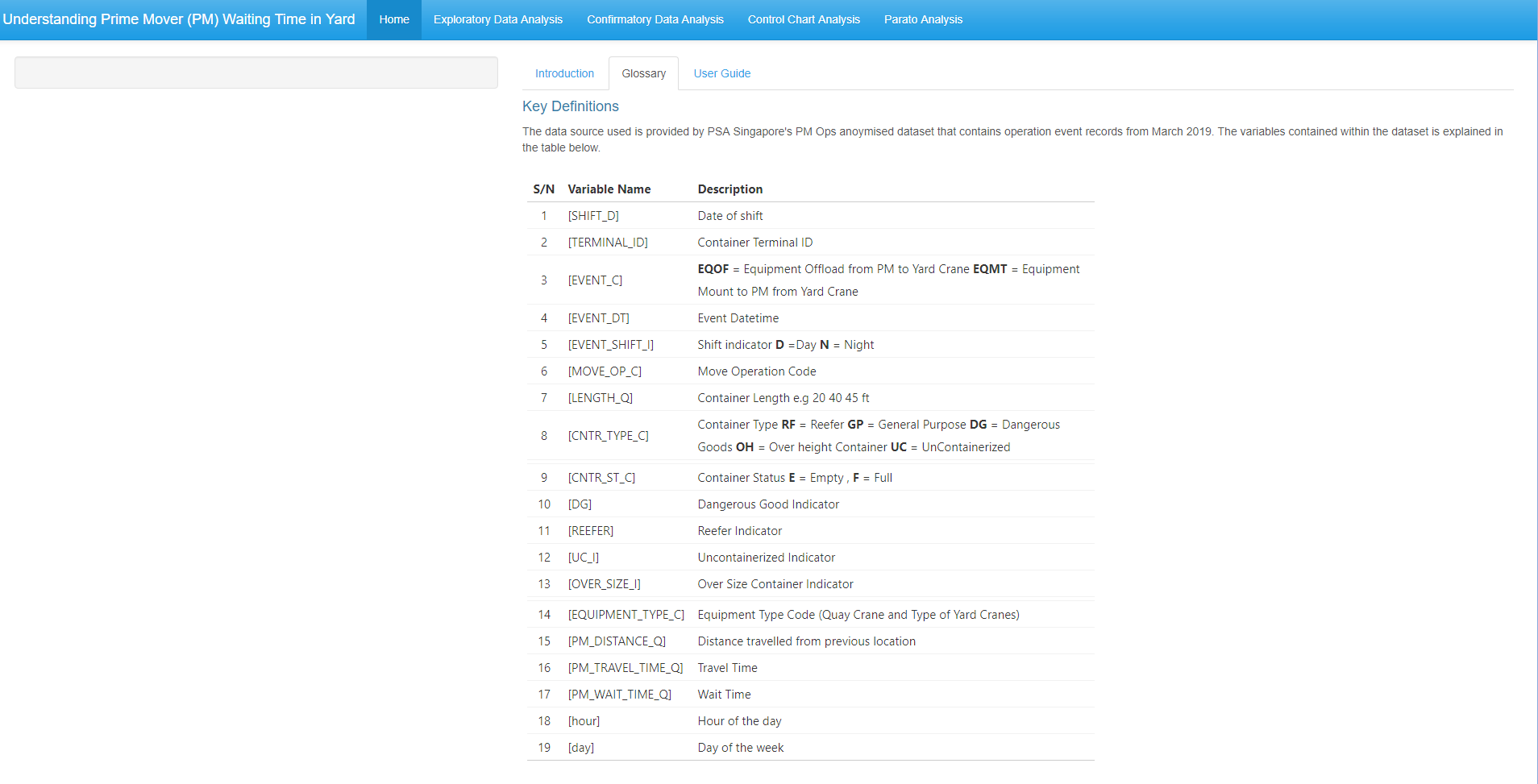
1. **Home Page**
   1. **Introduction**

On this page, there is a short introduction regarding PSA operations, some key definitions, and a short paragraph for the motivation in creating the Shiny app.



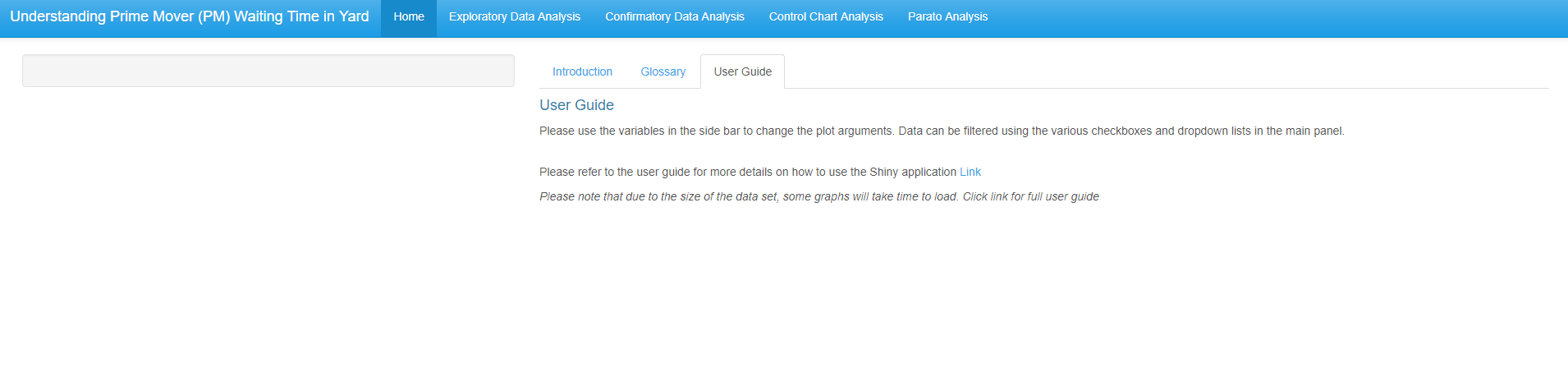
* 1. **Glossary**

A glossary is provided for the variables in the dataset as some of the terms and names are operations-specific which non-operational staff may not know the full context of.

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* 1. **User Guide**

A short user guide is provided to explain how to use the application. A more detailed user guide from the project github is linked for a more in-depth explanation on how to use the application.

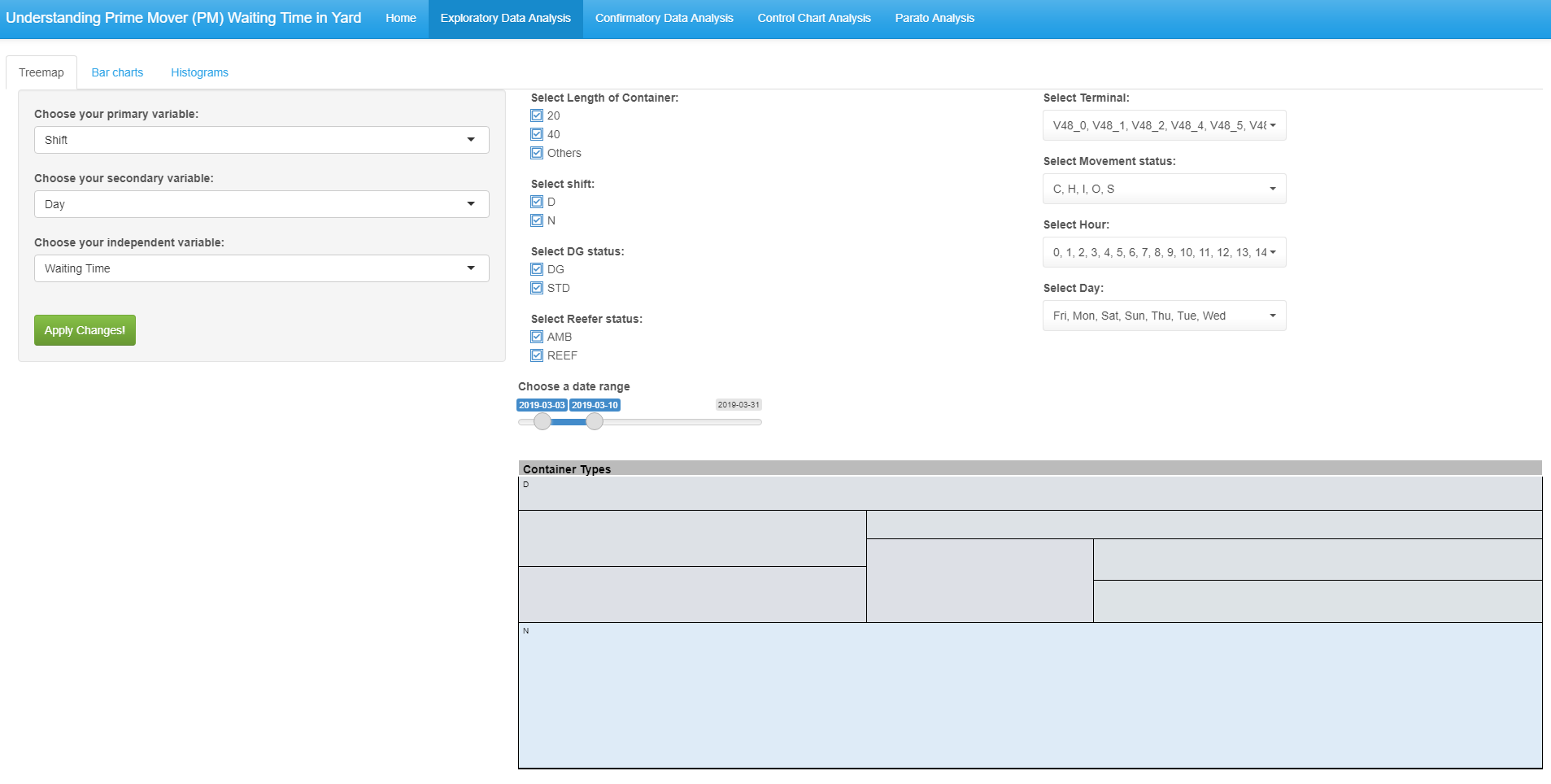
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1. **Exploratory Data Analysis**

The first content tab is for exploratory data analysis, helping the user to visualise and understand the various activities in PM operations.

* 1. **Treemap**

A treemap is used to help visualise the hierarchical relationships within PM operations.

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[1] Select the desired primary variable. Only Shift and Day are included. This will form the breakdown of the boxes in the treemap. The continuous variable used is the count of rows in the dataset.

[2] Select the secondary variable. Only Day and Hour are included. This will form the breakdown for the lower-level boxes in the treemap. The continuous variable used is the count of rows in the dataset.

[3] Select between PM Waiting Time and Travel Time for the continuous variable.

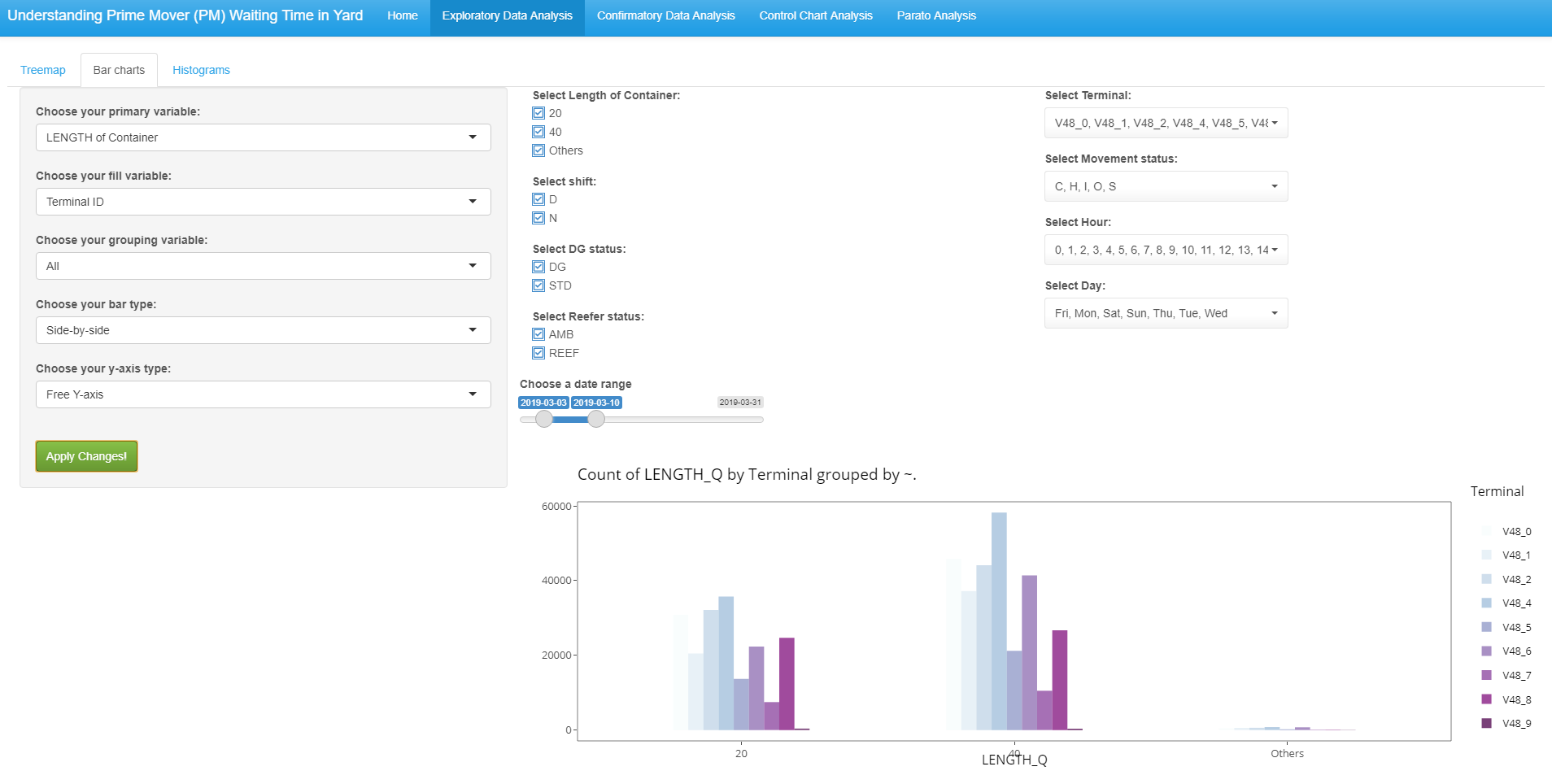
[4] The checkboxes, dropdown lists, and slider allow the user to filter the data. This enables more in-depth analysis for specific variables that the user might want to perform. The filters using checkboxes are: Length of container, Shift, DG status, and Reefer Status. The filters using dropdown lists are: Terminal number, Movement Status, Hour of day, and Day. These filters are populated will all unique variables for the ease of use. There are also “Select All” and “Deselect All” buttons for user convenience. The slider is used to filter the Date range that the user wants to analyse. These filters are repeated for all panels in Exploratory Data Analysis and Confirmatory Data Analysis.

[5] The “Apply Changes” button will activate the filters and arguments to generate the treemap. This is to prevent instantaneous loading when arguments or filters are changed which can affect the performance of the application.

[6] The treemap will be shown in this area. This treemap is interactive, and users and select individual boxes to see the count of rows within that particular category or sub-category.

* 1. **Bar Chart**

Bar charts are used to see the distribution and breakdown of the variables in the data set.



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[1] Select the primary variable for the x-axis of the bar chart. The available variables are: Length of container, Shift, DG Status, Reefer Status, Terminal, Hour, and Day.

[2] Select the fill variable for the bar chart. This will determine the colour fill within the bar chart. The variables available are the same as the primary variable.

[3] Select the grouping variable for the bar chart. This will determine the facet variable which will divide the dataset and plot bar charts according to this variable. The variables available are the same as the primary variable.

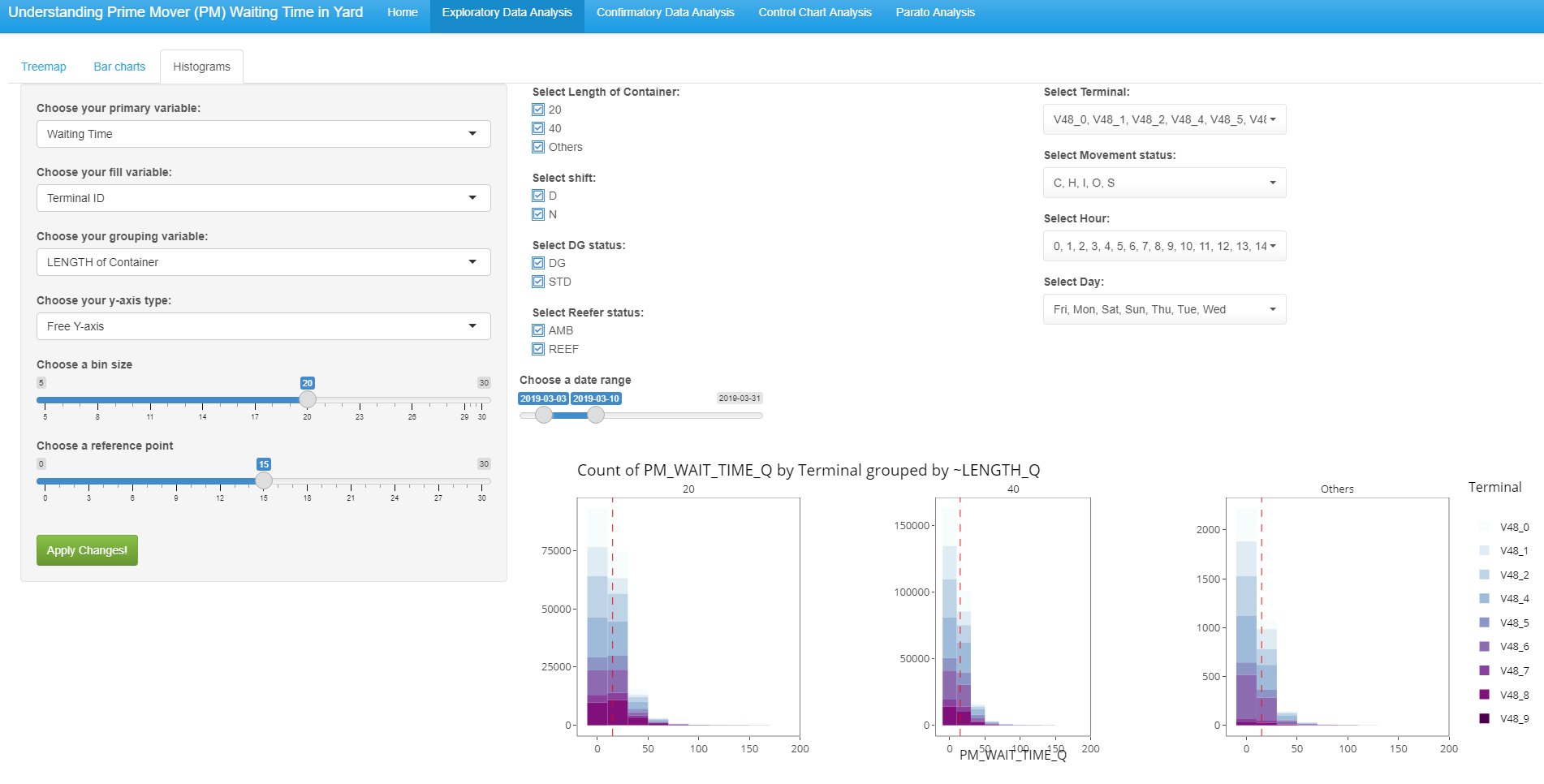
[4] Select the stacking type of the bar chart. There are two types available, side-by-side and stacked, which determines the style of the bars in the chart.

[5] Select the type of y-axis. There are two types available, standardised or free-y. This changes the style of the y-axis for facet charts. A standardised axis means that the scale of the y-axes is the same. A free-y-axis refers to each faceted bar chart having its own scale.

[6] The bar chart will be shown in this area. The bar chart is interactive, with users being able to see the counts and details of each bar.

* 1. **Histogram**

Histograms are used to visualise the shape and spread of the continuous variables (waiting time and travel time). Taller bars represent greater counts of data in that range.

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[1] Select the primary variable for the x-axis. There are two variables, either PM Wait Time or Travel Time.

[2] Select the fill variable for the bar chart. This will determine the colour fill within the bar chart. The available variables are: Length of container, Shift, DG Status, Reefer Status, Terminal, Hour, and Day.

[3] Select the grouping variable for the bar chart. This will determine the facet variable which will divide the dataset and plot histograms according to this variable. The variables available are the same as the fill variable.

[4] Select the type of y-axis. There are two types available, standardised or free-y. This changes the style of the y-axis for facet charts. A standardised axis means that the scale of the y-axes is the same. A free-y-axis refers to each faceted bar chart having its own scale.

[5] Select a bin size using a slider. This will help to determine the range of each bar.

[6] Select a reference point using a slider. This determines the position of the red reference point in the histogram. This can be used to visualise outliers within the histogram.

[7] The histogram will be shown in this area. The histogram is interactive, with users being able to see the counts and details of each chart. If the facet is too detailed, for example with Terminal ID, users can also zoom in using controls on the top right hand corner of the chart.

**Confirmatory Data Analysis**

1. **Pareto Analysis**
2. **Control Chart**