

32146 Data Visualisation and Visual Analytics – Spring 2023

Assessment Task 3: Visual Analytics

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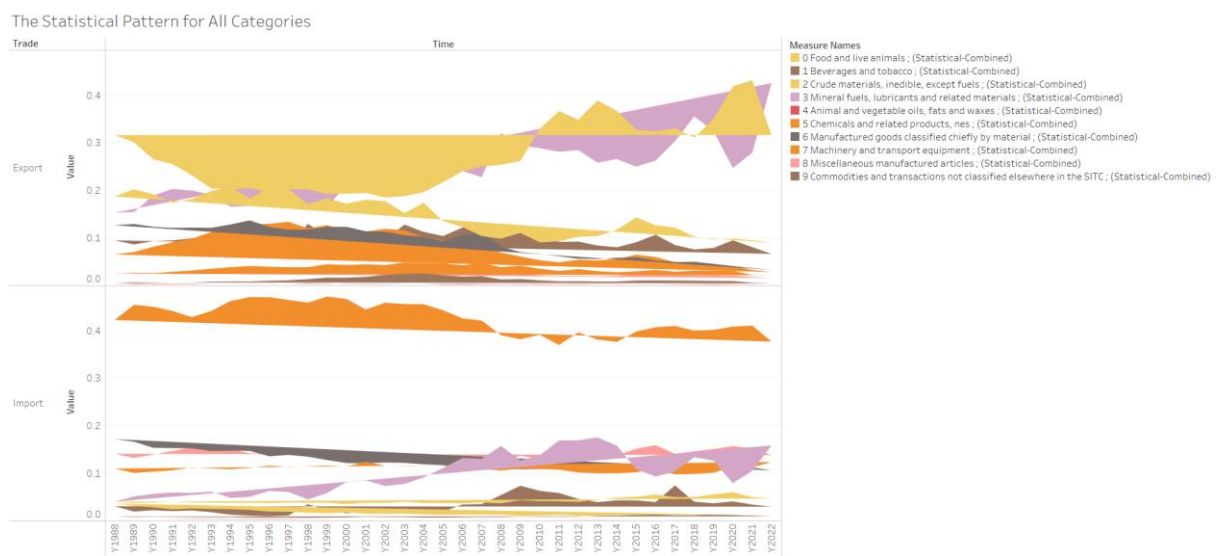
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Summary

The dataset is made up of rows for over 30 years spanning across 2 centuries. This is further divided into 10 categories that are further split into a total of 67 sub-categories. The process involved while analysing the dataset to create visualisations has been an immense task of pre-processing and applying relevant formulas. At the end of this a total of 10 sheets, 3 dashboards and 1 story board has been made using Tableau. Last but not the least, the category being chosen as primary was 7th one namely, Machinery and transport equipment.

Findings in Data Visualisation Process

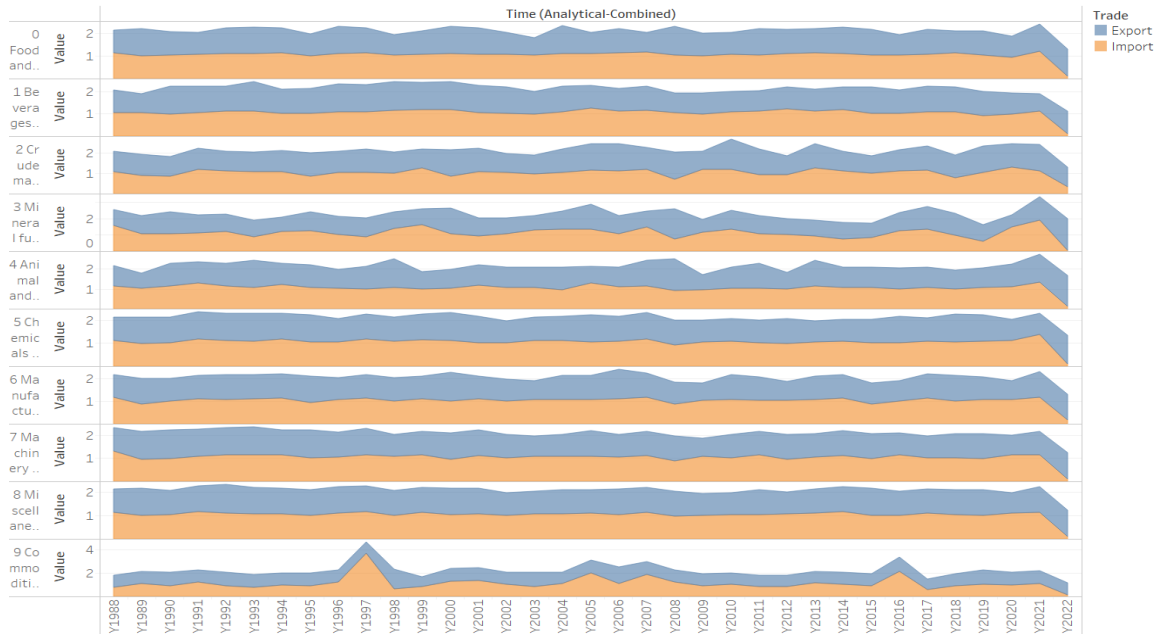
Throughout the course of forementioned visualisations created, there were various findings and insights made as explained ahead.



The visualisation above was created for Statistically comparing the pattern or trend for all 10 categories across given time frame. We basically, made an analysis of the export VS import for all the categories with the categories mentioned on right hand side in the legend. This was colour coded for ease of understanding. Also, this data was filtered on using only the statistical measurements developed.

The chart used for visualising this was a polygon chart by having export above import on the page. This was compared using the measurements developed by us in pre-processing of the data. Out of the various sheets developed, this one used the statistical combination being made earlier.

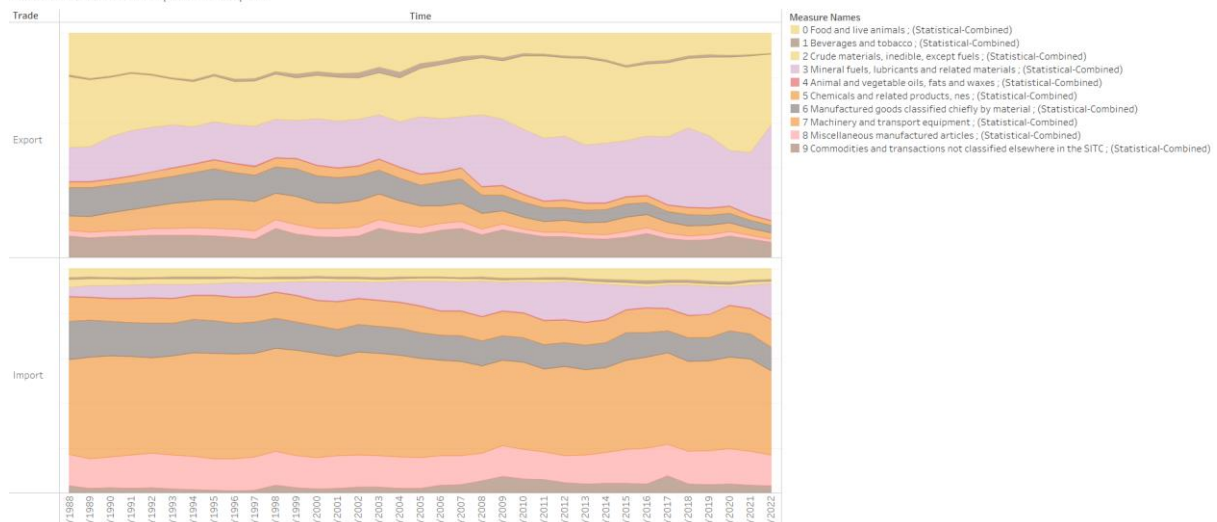
The Analytical Pattern for All Categories



The visualisation above was created for Analytically comparing the pattern or trend for all 10 categories across given time frame. We basically, made an analysis of the export VS import for each category and stacked the import and export on top of each other. This was also colour coded for ease of understanding. Also, this data was filtered on using only the statistical measurements developed. This page provides an insight into how each category changed across the time when compared to itself for import vs export.

The chart used for visualising this was an area chart by having each category on the page. This was compared using the measurements developed by us in pre-processing of the data. Out of the various sheets developed, this one used the analytical combination being made earlier.

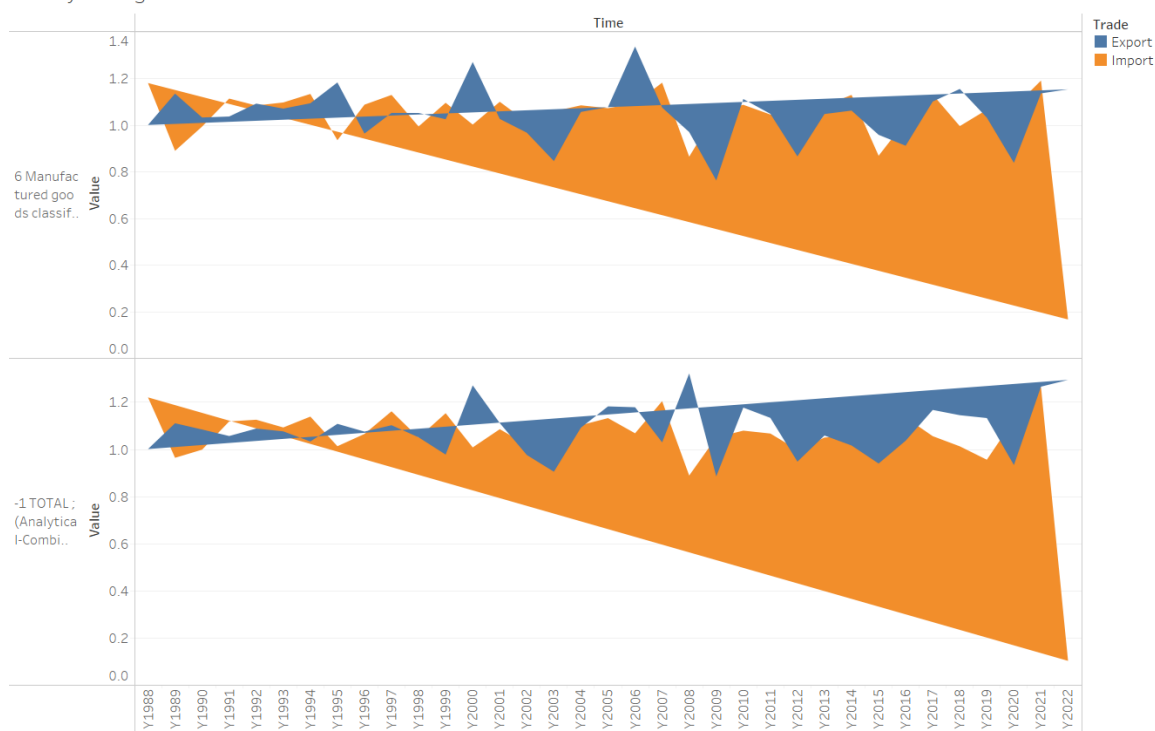
Stacked Chart for Import VS Export



The visualisation above was created for Statistically comparing the pattern or trend for all 10 categories across given time frame. We basically, made an analysis of the export VS import for all the categories with the categories mentioned on right hand side in the legend. This was colour coded for ease of understanding. Also, this data was filtered on using only the statistical measurements developed during the pre-processing of the dataset. This sheet gave us an understanding of how much each category contributed to the total trade percentage across the time.

The chart used for visualising this was a stacked-area chart by having export above import on the page. This was compared using the measurements developed by us in pre-processing of the data. Out of the various sheets developed, this one used the statistical combination being made earlier.

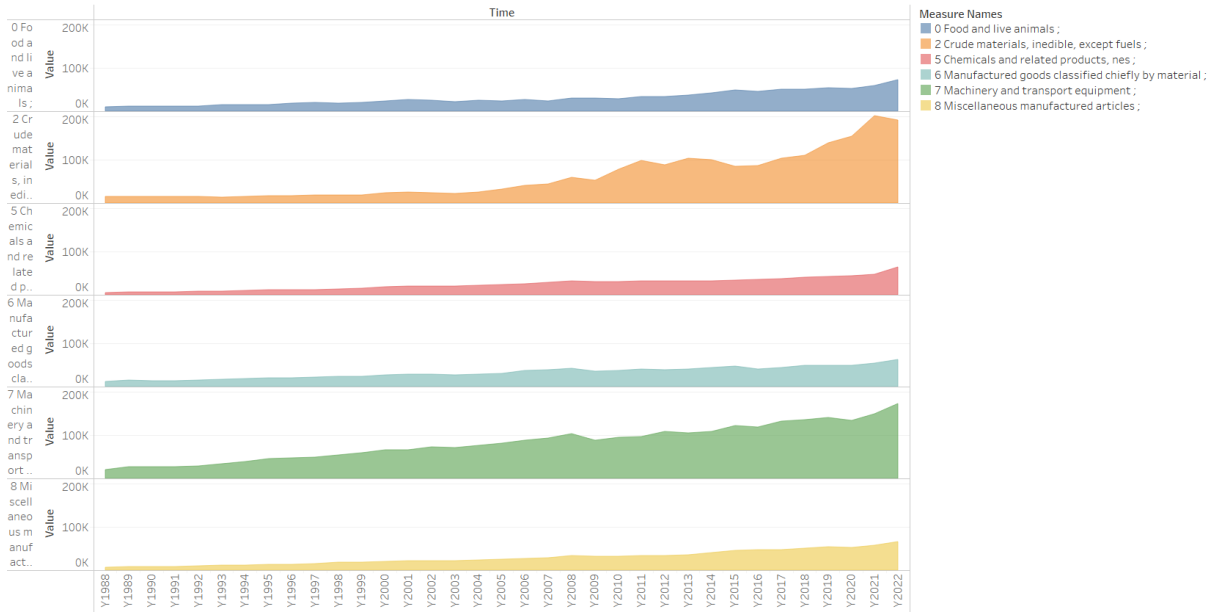
Yearly Change for Total VS Manufactured Goods



The visualisation above was created for Analytically comparing the pattern or trend for total trade vs Manufactured Goods. We basically, made an analysis on how relatively the trade for our chosen category changes with respect to the total trade across import and export as mentioned on right hand side in the legend. This was colour coded for ease of understanding. Also, this data was filtered on using only the analytical measurements developed during the pre-processing of the dataset. The sheet on an overall perspective shared insights on how our chosen category performs for the time frame against total sales or trade.

The chart used for visualising this was a polygon chart by having our category above total on the page. This was compared using the measurements developed by us in pre-processing of the data. Out of the various sheets developed, this one used the analytical combination being made earlier.

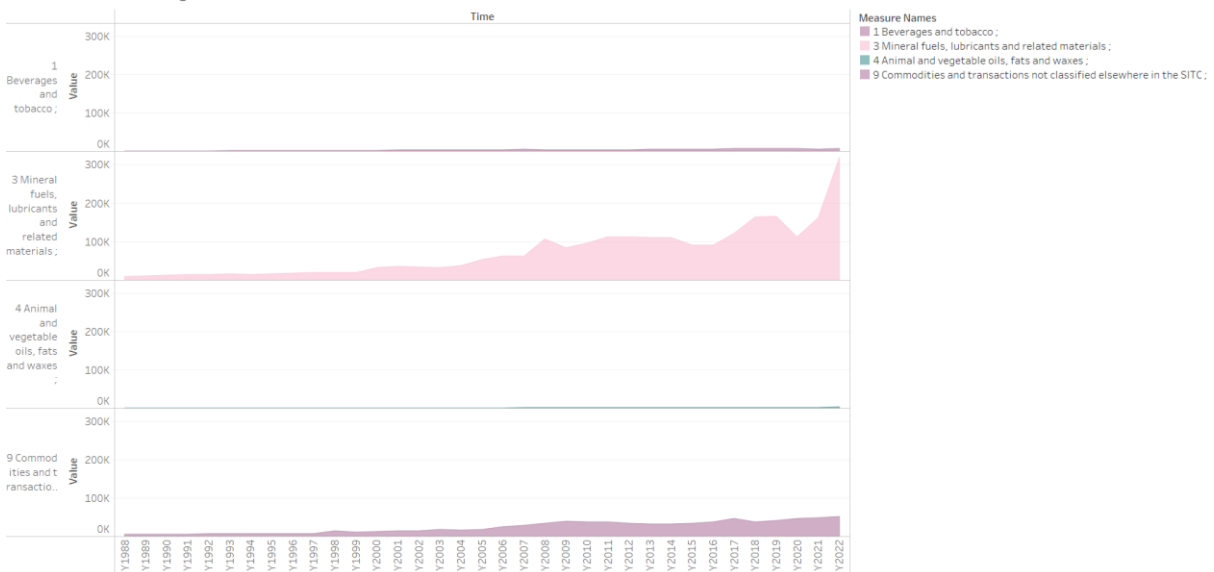
Equal to 9 Sub- Categories



The visualisation above was created for comparing the pattern or trend for categories that had 9 sub-categories or more than them. We basically, made an analysis on how relatively the trade for categories with more sub-categories changes with respect to those which have lesser as mentioned on right hand side in the legend. This was colour coded for ease of understanding. The sheet on an overall perspective shared insights on how each category performs for the time frame against the other. This was compared for the total trade and not import or export as only so much granularity was required for the analysis.

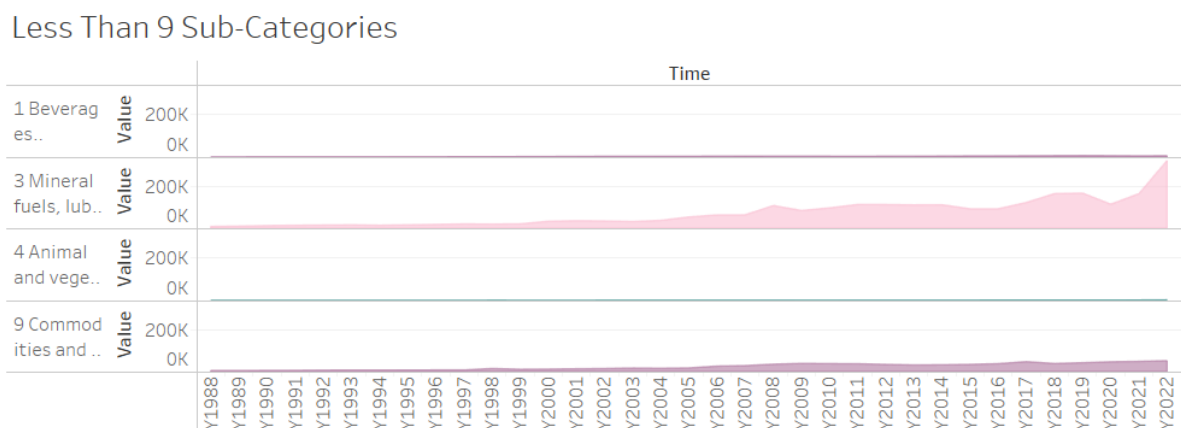
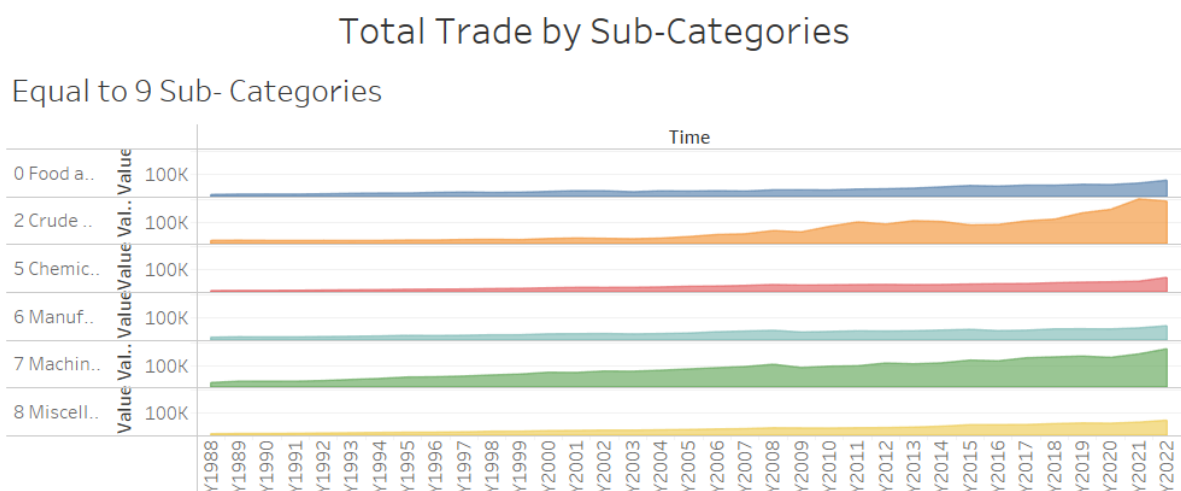
The chart used for visualising this was an area chart by having each category sorted in order of the dataset and normalised. This was compared using the measurements developed by us in pre-processing of the data.

Less Than 9 Sub- Categories



The visualisation above was created for comparing the pattern or trend for categories that had less than 9 sub-categories. We basically, made an analysis on how relatively the trade for categories with less sub-categories changes with respect to those which have more as mentioned on right hand side in the legend. This was colour coded for ease of understanding. The sheet on an overall perspective shared insights on how each category performs for the time frame against the other. This was compared for the total trade and not import or export as only so much granularity was required for the analysis.

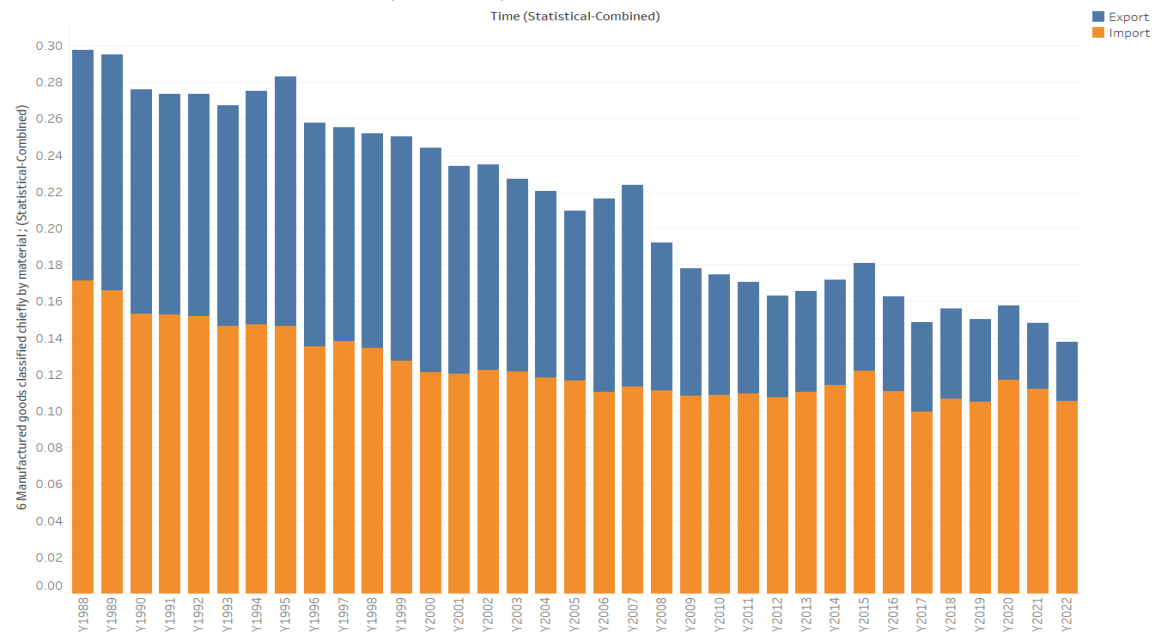
The chart used for visualising this was an area chart by having each category sorted in order of the dataset and normalised. This was compared using the measurements developed by us in pre-processing of the data.



The visualisation above was created for comparing the pattern or trend for categories that had less than 9 sub-categories or more. This was colour coded for ease of understanding. The dashboard on an overall perspective shared insights on how categories with less sub-categories perform against those with more for the time frame against the other. This was compared for the total trade and not import or export as only so much granularity was required for the analysis.

The charts used for visualising this were 2 area charts by having each category sorted in order of the dataset and normalised. This was compared using the measurements developed by us in pre-processing of the data.

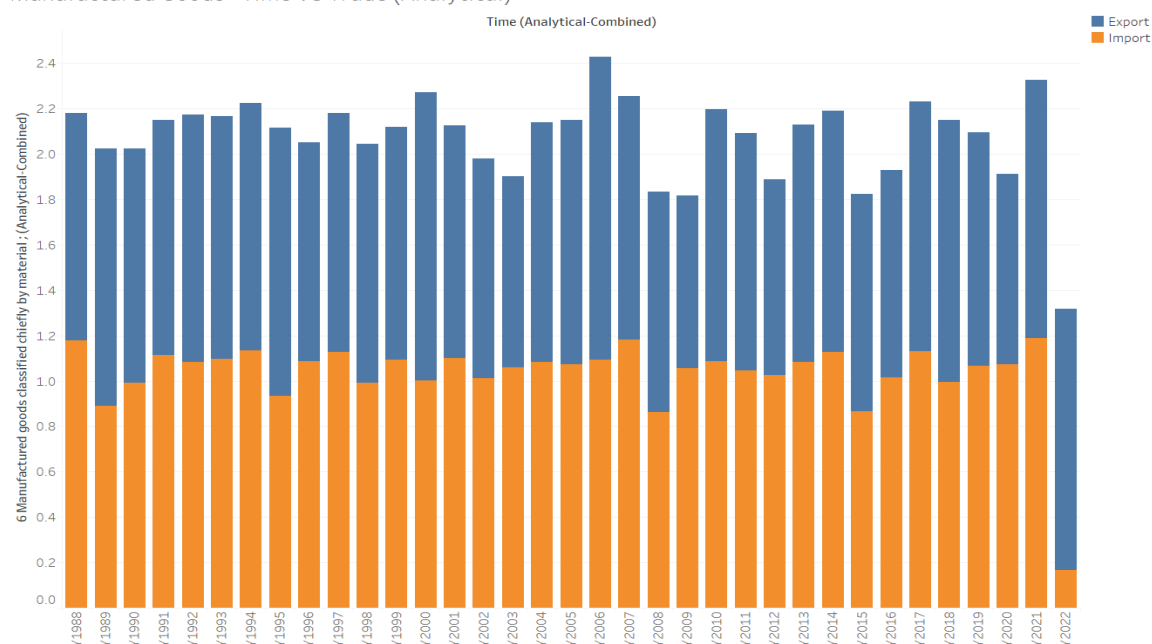
Manufactured Goods - Time VS Trade (Statistical)



The visualisation above was created for Statistically comparing the pattern or trend for Manufactured Goods. We basically, made an analysis on how relatively the trade for our chosen category changes across import and export as mentioned on right hand side in the legend for the given time frame. This was colour coded for ease of understanding. Also, this data was filtered on using only the statistical measurements developed during the pre-processing of the dataset. The sheet on an overall perspective shared insights on how our chosen category performs for the time frame against total sales or trade.

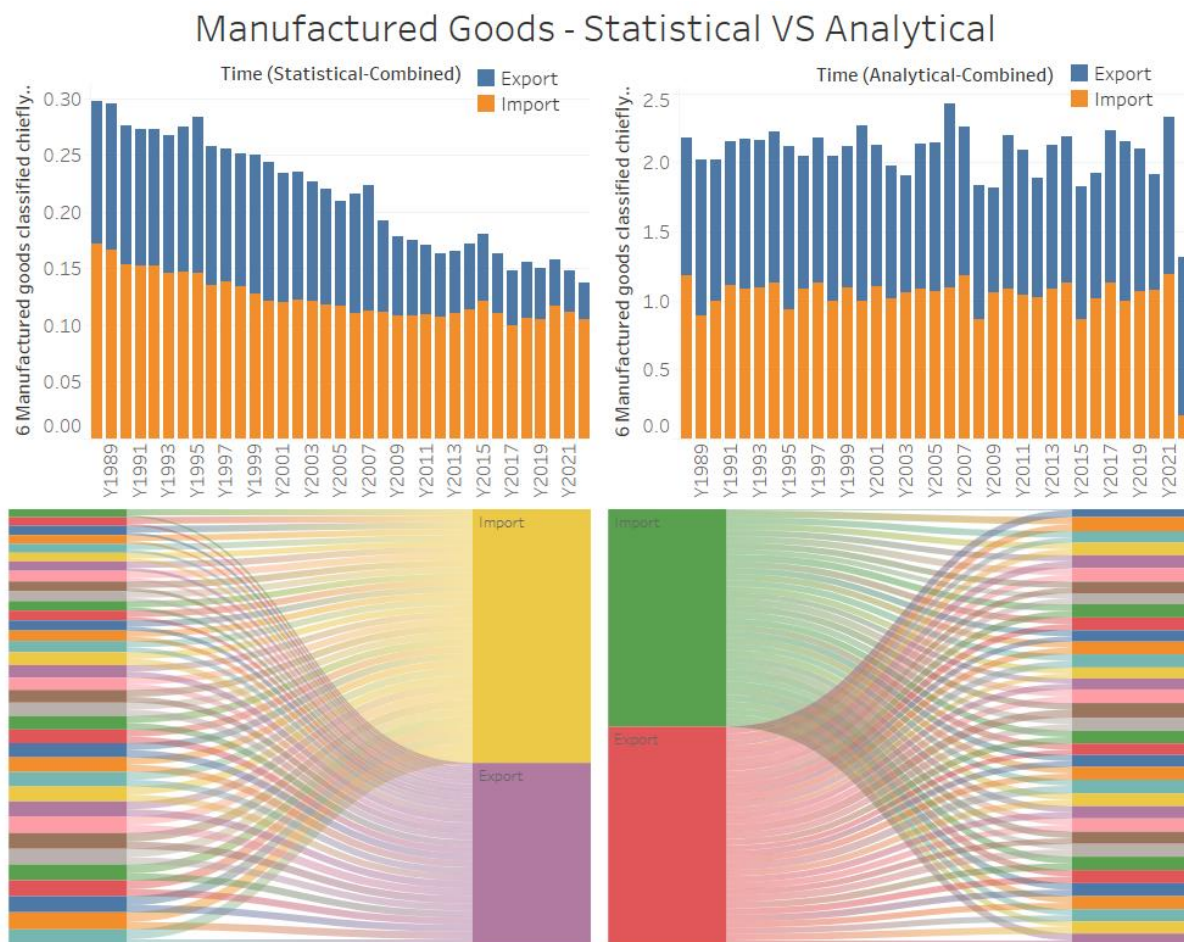
The chart used for visualising this was a bar chart by having our import above export on the page. This was compared using the measurements developed by us in pre-processing of the data. Out of the various sheets developed, this one used the statistical combination being made earlier.

Manufactured Goods - Time VS Trade (Analytical)



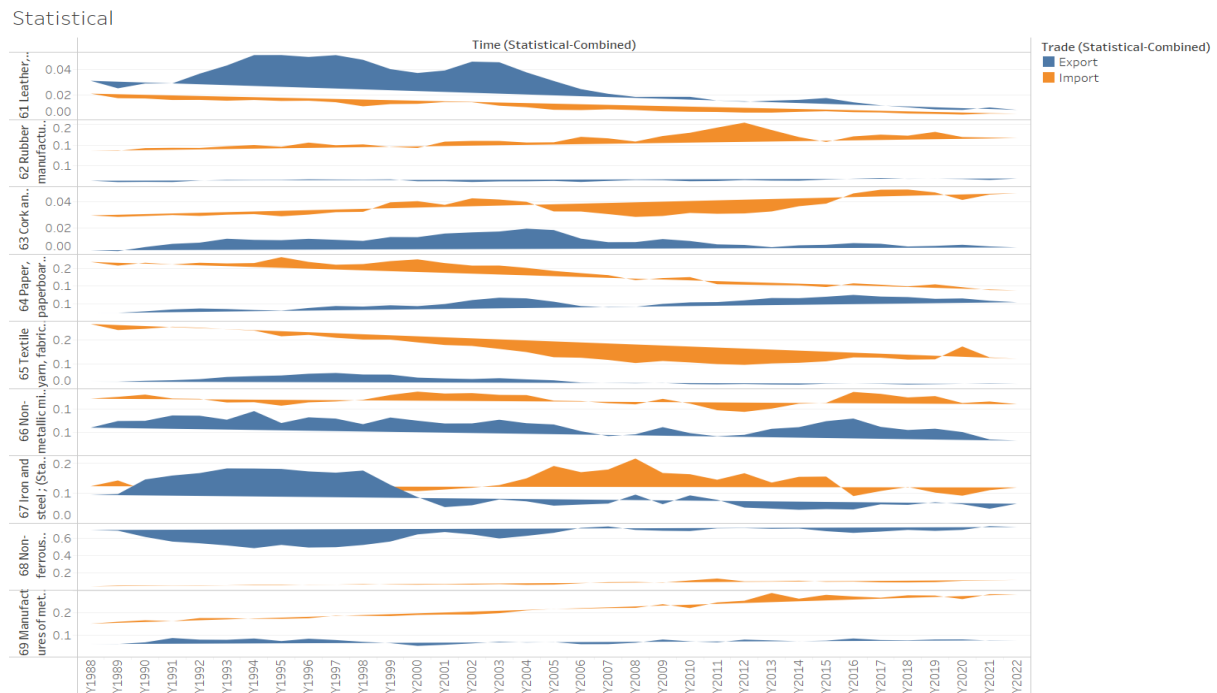
The visualisation above was created for Analytically comparing the pattern or trend for Manufactured Goods. We basically, made an analysis on how relatively the trade for our chosen category changes across import and export as mentioned on right hand side in the legend for the given time frame. This was colour coded for ease of understanding. Also, this data was filtered on using only the analytical measurements developed during the pre-processing of the dataset. The sheet on an overall perspective shared insights on how our chosen category performs for the time frame against total sales or trade.

The chart used for visualising this was a bar chart by having our import above export on the page. This was compared using the measurements developed by us in pre-processing of the data. Out of the various sheets developed, this one used the analytical combination being made earlier.



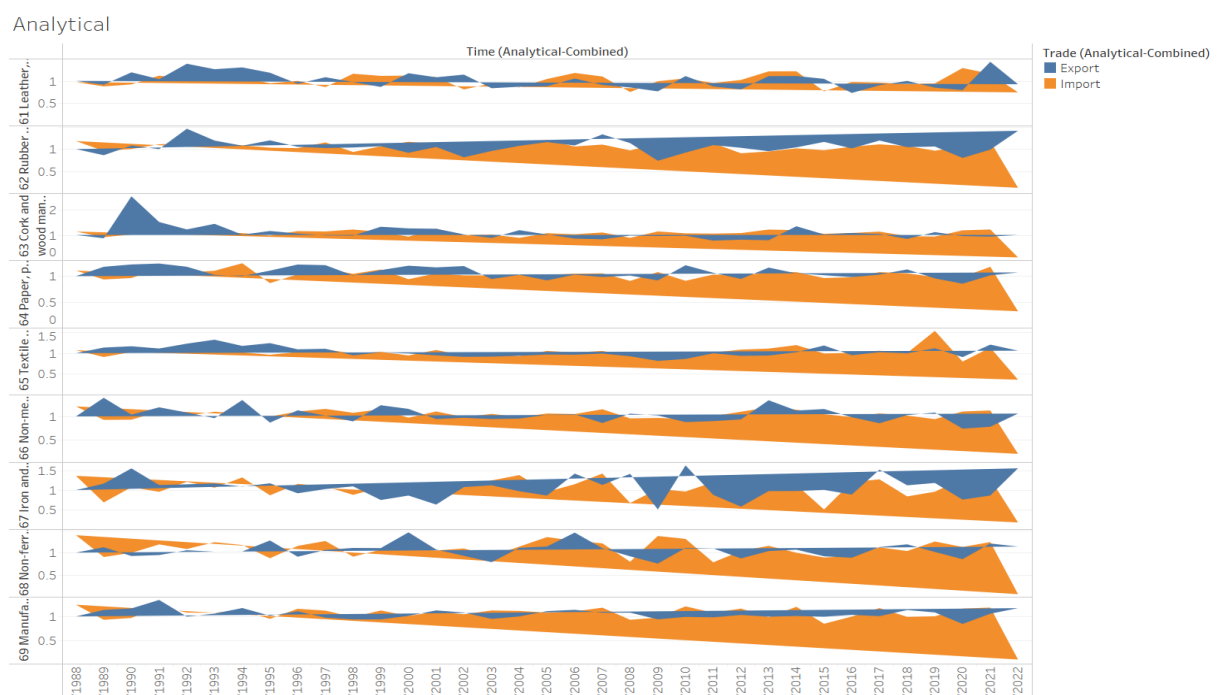
The visualisation above was created for comparing the pattern or trend for our chosen category both statistically and analytically. This was colour coded for ease of understanding. The dashboard on an overall perspective shared insights on how our category performed for the time frame against the other in 2 different mathematical ways. This was compared for both import or export for each of the categories. Next, a Sankey diagram was also made for each of the categories.

The charts used for visualising this were 2 bar charts and Sankey diagrams of the dataset. This was compared using the measurements developed by us in pre-processing of the data.



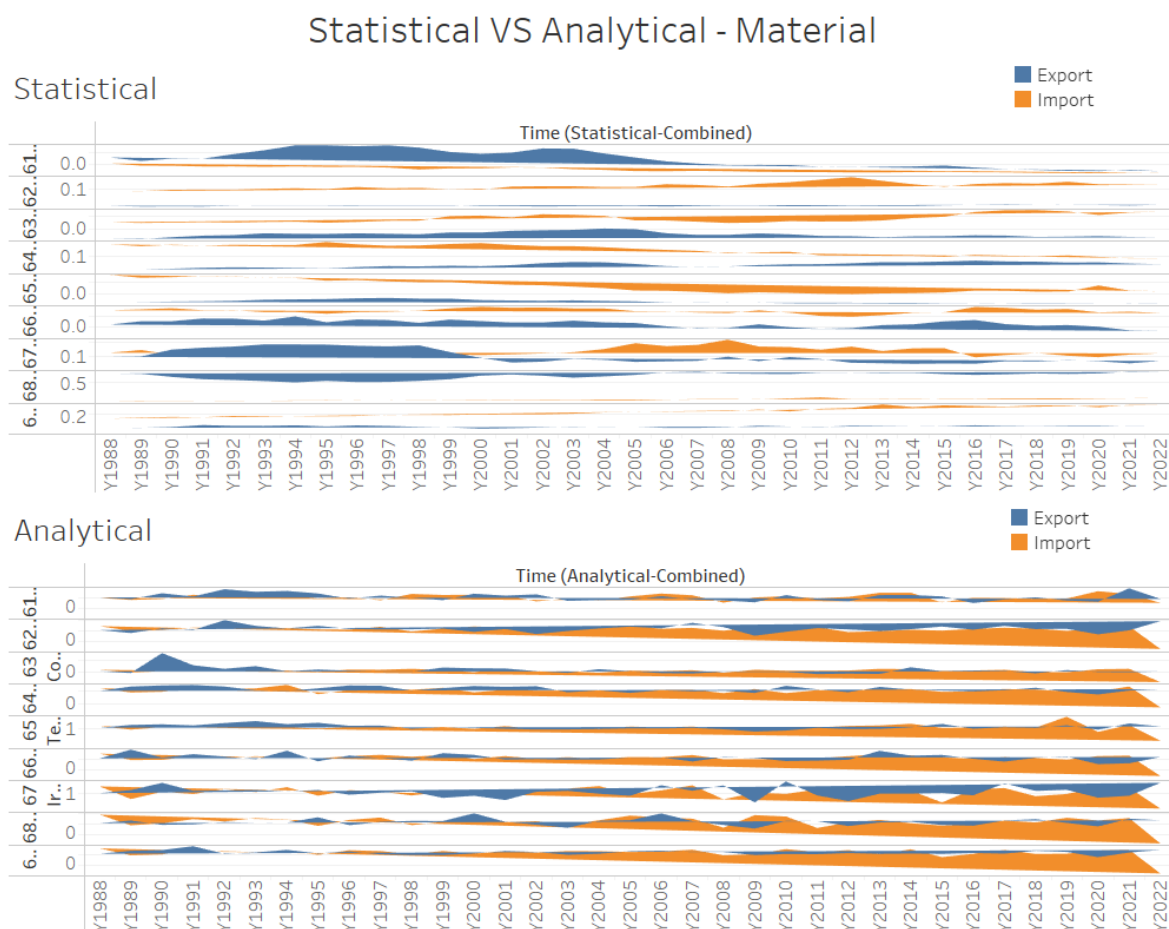
The visualisation above was created for Statistically comparing the pattern or trend for each type of the Manufactured Goods. We basically, made an analysis on how relatively the trade for each sub-category of our chosen category changes across import and export as mentioned on right hand side in the legend for the given time frame. This was colour coded for ease of understanding. Also, this data was filtered on using only the statistical measurements developed during the pre-processing of the dataset.

The chart used for visualising this was a polygon chart by having each sub-category over the other on the page. This was compared using the measurements developed by us in pre-processing of the data. Out of the various sheets developed, this one used the statistical combination being made earlier.



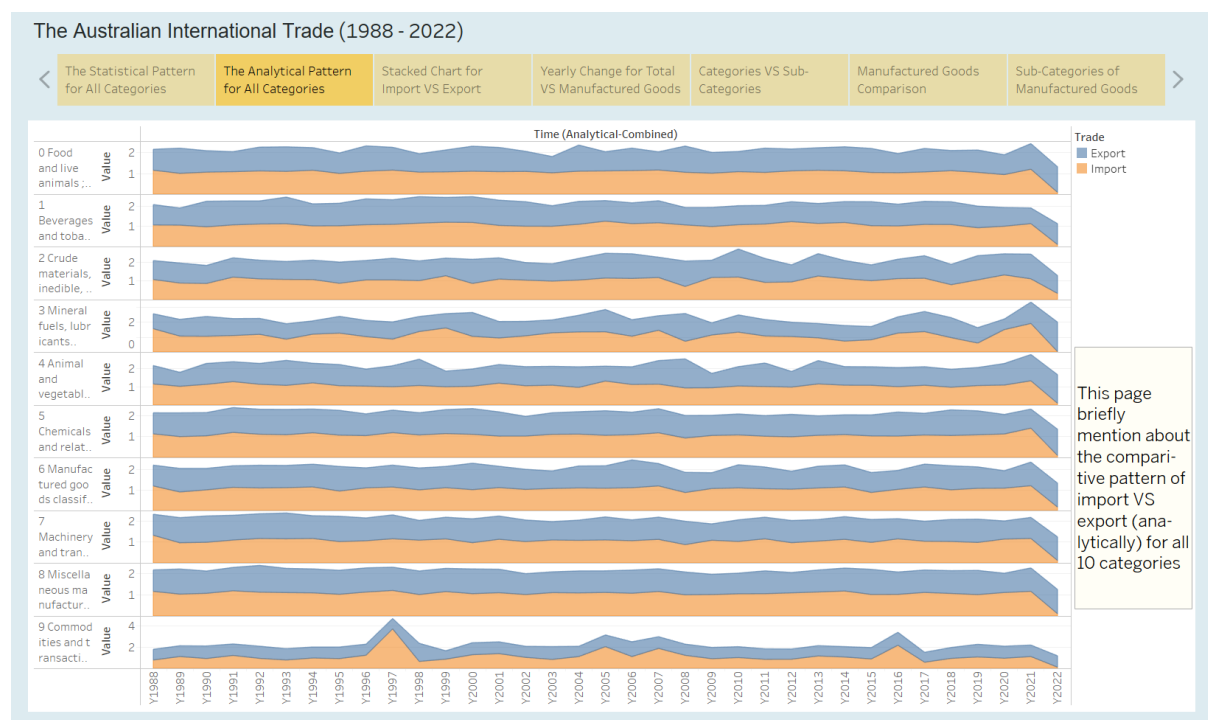
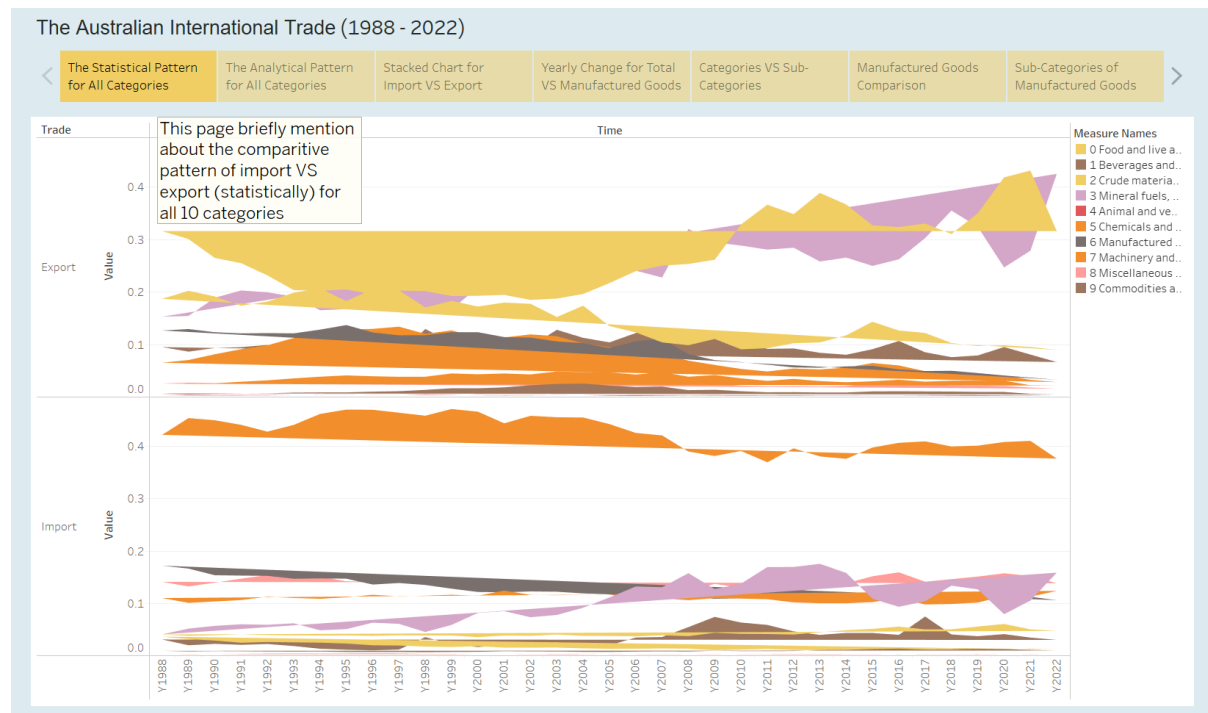
The visualisation above was created for Analytically comparing the pattern or trend for each type of the Manufactured Goods. We basically, made an analysis on how relatively the trade for each sub-category of our chosen category changes across import and export as mentioned on right hand side in the legend for the given time frame. This was colour coded for ease of understanding. Also, this data was filtered on using only the analytical measurements developed during the pre-processing of the dataset.

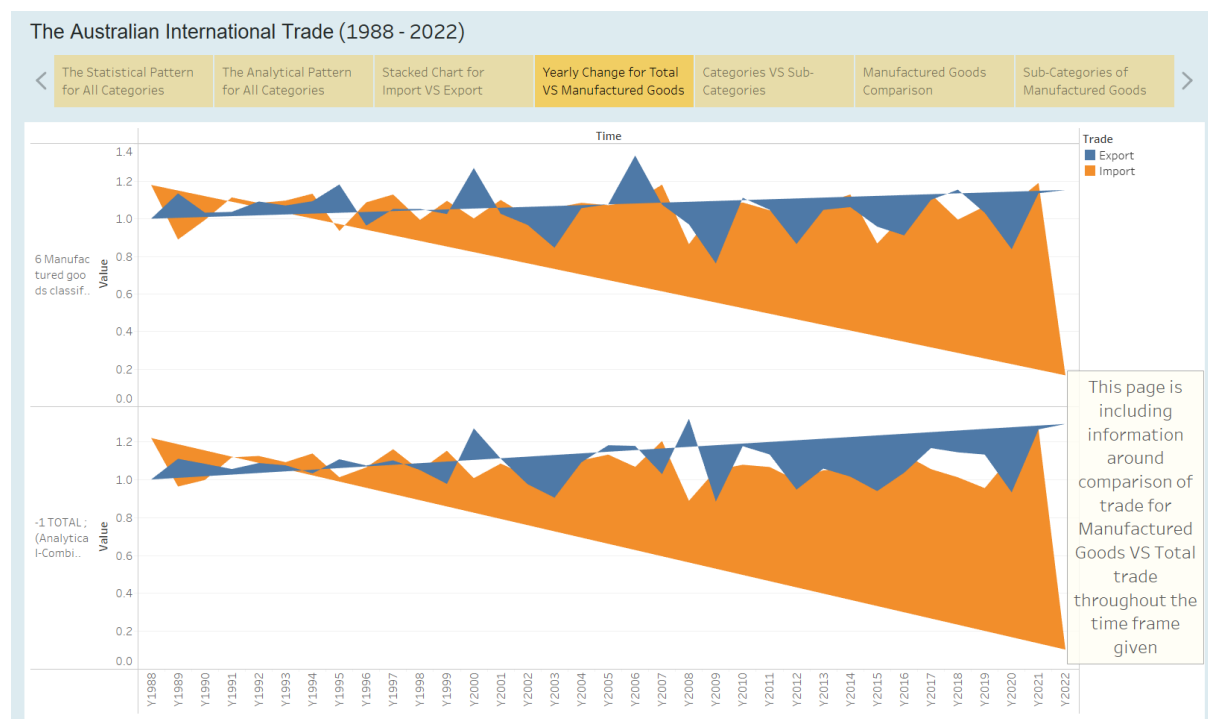
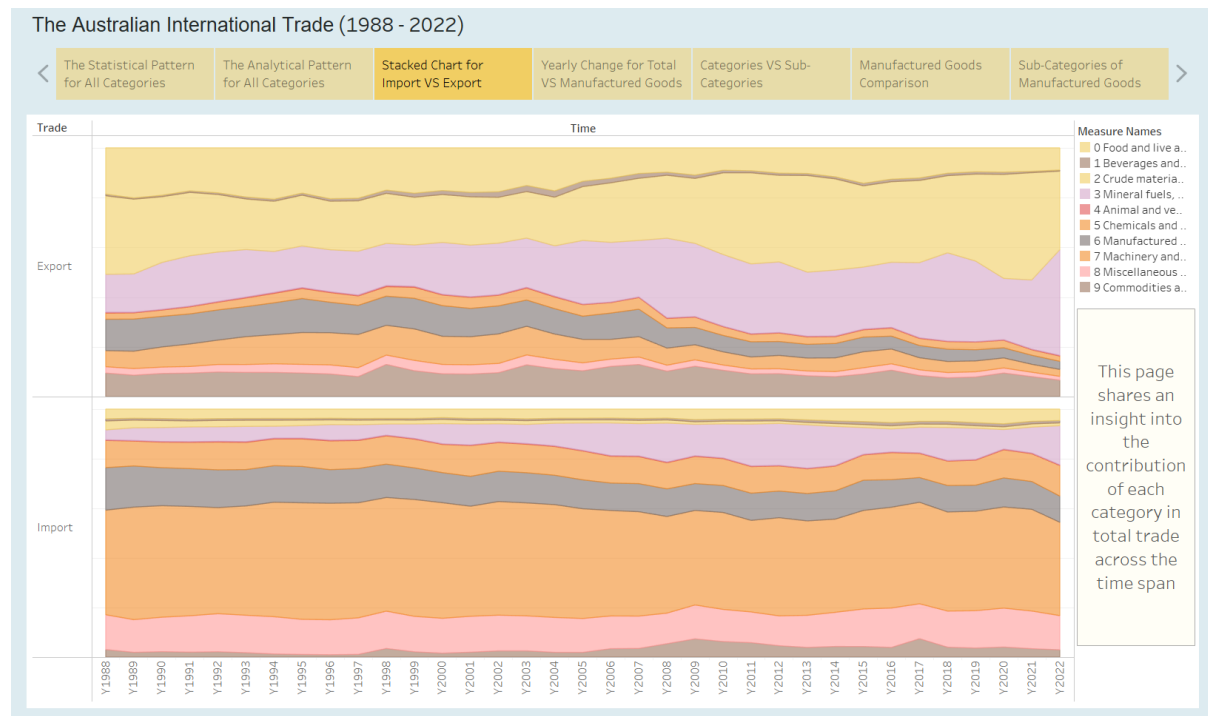
The chart used for visualising this was a polygon chart by having each sub-category over the other on the page. This was compared using the measurements developed by us in pre-processing of the data. Out of the various sheets developed, this one used the analytical combination being made earlier.



The visualisation above was created for comparing the pattern or trend for each of our chosen category's sub-category both statistically and analytically. This was colour coded for ease of understanding. The dashboard on an overall perspective shared insights on how each of our category's sub-category performed for the time frame against the other in 2 different mathematical ways. This was compared for both import or export for each of the categories.

The charts used for visualising this were 2 polygon charts of the dataset. This was compared using the measurements developed by us in pre-processing of the data; statistical and analytical.



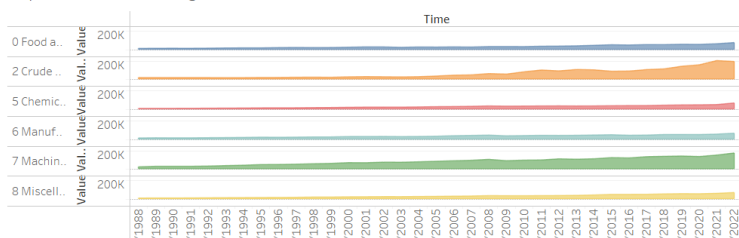


The Australian International Trade (1988 - 2022)

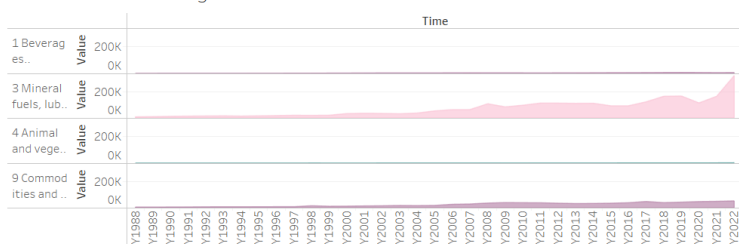
- [The Statistical Pattern for All Categories](#)
[The Analytical Pattern for All Categories](#)
[Stacked Chart for Import VS Export](#)
[Yearly Change for Total VS Manufactured Goods](#)
[Categories VS Sub-Categories](#)
[Manufactured Goods Comparison](#)
[Sub-Categories of Manufactured Goods](#)

Total Trade by Sub-Categories

Equal to 9 Sub-Categories



Less Than 9 Sub-Categories

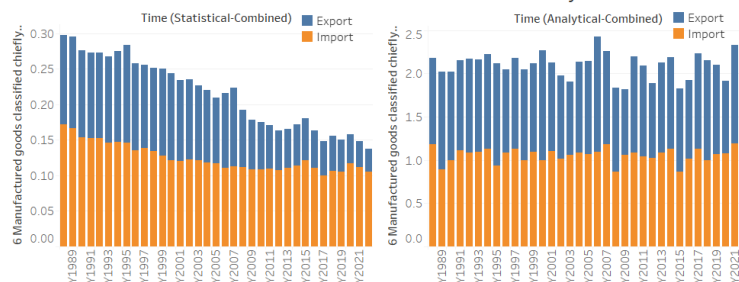


This page provides insights by comparing categories that had more VS less than 9 sub-categories in each of them, respectively

The Australian International Trade (1988 - 2022)

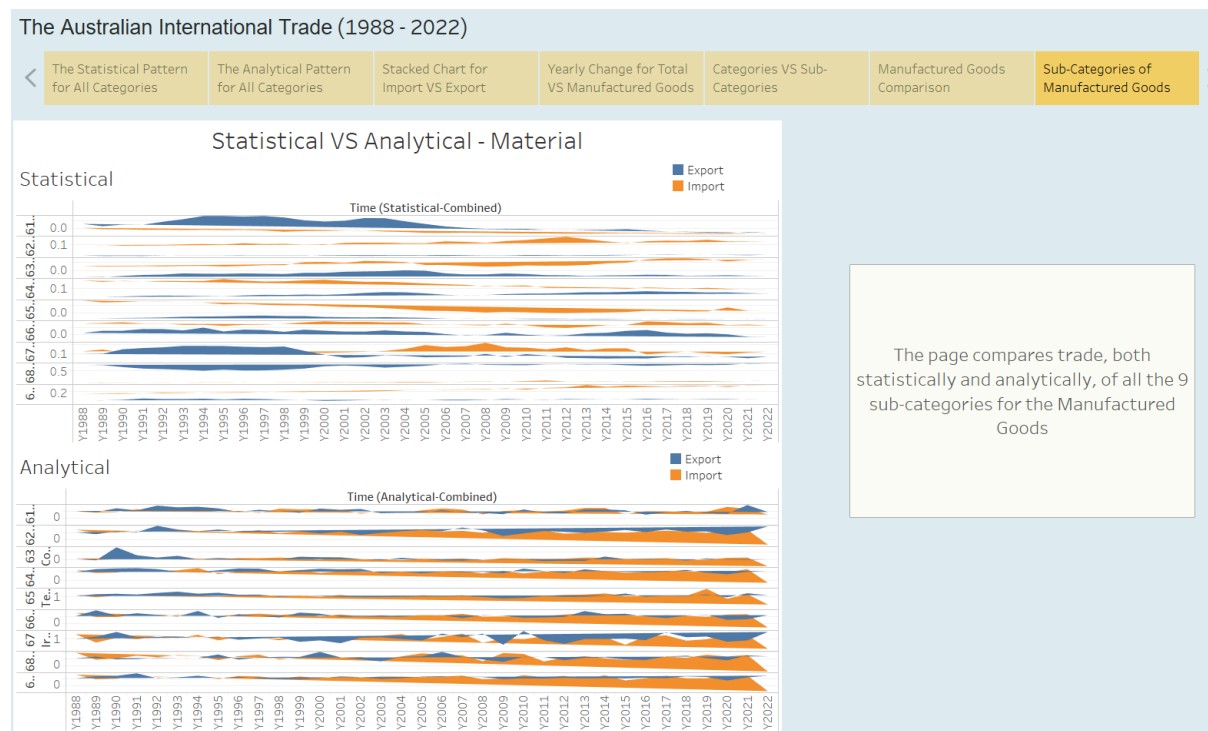
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[Categories VS Sub-Categories](#)
[Manufactured Goods Comparison](#)
[Sub-Categories of Manufactured Goods](#)

Manufactured Goods - Statistical VS Analytical



The following page is made up of relative comparison of the manufactured goods produced statistically VS analytically for this category

Further, it's provides insights by drawing on Sankey Diagram for each, respectively based on Trade type



Based on the above pages consisting of dashboards and sheets a story board was built as can be seen above. This consisted of 7 pages for the story each highlighting its own advantages and small description of the visualisation.

This was also formatted for being pleasing to the eyes and readable by the user easily. Furthermore, adjustments were made throughout the entire report and tableau file based on this. To conclude this section an industry-level dashboard has been presented which makes it easy for the user to dwell through one's work and get the most insights.

Trends VS Outliers

The trends being observed in the report were as follows:

1. Export on Crude Oil was relatively lower until 2010 to the later part of the dataset.
2. There was a sudden hike in the import of Commodities in the year 1997 as compared to the rest of the dataset.
3. The import of Machinery remained constantly the highest across the entirety of time.
4. The export was dominated by Crude towards the early half of the dataset then being followed by Minerals and Crude Oil for rest of the time frame.
5. Minerals was the only category which touched trade close to 300+ M across the entire dashboard.

The outliers being observed in the report were as follows:

1. Trade of Food and Manufactured goods was relatively low as compared to rest of the categories having more than or equal to 9 sub-categories.
2. Trade of Beverages and Animals was relatively low as compared to rest of the categories having more less than 9 sub-categories.
3. Analytically speaking, the import of manufactured goods for year 2022 was the lowest across the entire time.
4. Statistically speaking, export was dominated by import on an overall basis for the chosen category.
5. Sudden increase in observed in the import of Commodities for the year 2009 and 2017.

Analysis of Trends and Outliers

The trends could have been occurred due to major reasons such as:

1. **Underlying Patterns:** Trends emerge when data exhibit a methodical and constant pattern over an extended period or across additional pertinent dimensions. This may be the result of behavioural shifts, underlying mechanisms, or outside influences on the data.
2. **Cyclical Patterns:** Certain trends tend to reoccur over time in cyclical patterns. For instance, cyclical patterns associated with business cycles are frequently seen in economic data.
3. **Seasonal Effects:** Variations in the seasons can also lead to trends. Seasonal variations in a phenomenon's prevalence could result in consistent patterns in the data.

The outliers could have been occurred due to major reasons such as:

1. **Errors or Anomalies:** Data points that substantially depart from the dataset's overall pattern are known as outliers. They may be the consequence of abnormalities in the data collection process, measurement errors, or data input errors.
2. **severe occurrences:** Rare or severe occurrences that significantly affect the data can also be the cause of outliers. Natural disasters, economic downturns, and other unforeseen calamities are examples of these events.
3. **Variability in the Data:** Outliers may occasionally reflect the inherent variability in the data. Most data points exhibit a specific pattern, but outliers draw attention to the rare occasions when the data acts otherwise.

Advantages VS Disadvantages of Dashboard and Storyboard Methodologies

The advantages of the dashboard and storyboard methodologies are as follows:

1. Storyboards enable users to construct a narrative flow by guiding viewers through a series of visualizations that tell a data-driven story.
2. Contextualization: Every "story point" in a storyboard has the potential to set the data in context and aid viewers in comprehending the development and importance of the visualizations.
3. Simplicity: Users with different levels of Tableau knowledge can develop storyboards because they are often easier to build than complicated dashboards.
4. Story Sharing: A comprehensive data story may be easily shared with others by using Tableau Story Points, which can be shared as a single, coherent entity.

The disadvantages of the dashboard and storyboard methodologies are as follows:

1. Limited Interactivity: Storyboards may provide fewer interactive features than dashboards, which might be problematic for customers who require more dynamic data exploration.
2. Dependency on Order: The arrangement of the plot points in a storyboard determines its efficacy, and altering this arrangement may have an impact on the story.
3. Less Real-time Interaction: In scenarios where real-time data exploration and updates are essential, storyboards might not be as appropriate.

Conclusion

To conclude with recommendations about the industries selected it can be mentioned that there was a variation amongst the different industries. All in all, a regulation needs to be put up on those which have been majorly dominating the market for those to profit which are losing. This will build an opportunity for all the retailers to have a fair share of trade and earn relatively same amount of money.

Along with this, a fair and similar trade across all categories will be causing the economy of the country to boom on an overall global level equally. This will also be beneficial for the country to make smarter decision on investing in resources viably.