Global Trade Analysis Dashboard

Introduction

This report critically reflects on my experience using Tableau and Power BI for creating interactive dashboards that analyse trade data. Both tools were evaluated for their features, usability, challenges, and overall performance during the assignment. The process involved creating similar visualizations in each tool, integrating them into a dashboard, and identifying the strengths and weaknesses of each platform. This reflection provides detailed comparisons, examples, and insights into the differences in workflow and functionality.

The Dataset

The Dataset The topic is Import and Export of Principal commodities into and from India. This topic was chosen because, India being a vast country, it will be very insightful to visualise the Import and Export data especially of principal commodities because considering India's population, definitely it will be in big numbers. The dataset consists of import and export data of principal commodities. The columns are, 'Principal commodity', 'Country', 'Unit', 'Quantity', 'Value'. I have taken 2021-22 and 2022-2023 datasets for both import and export. These are 6 columns, namely, Year, Principal Commodity, Country, Unit, Quantity, and Value(in Million $). Year defines whether it was in 2021-22 or in 2022-23, Principal commodity is the name of the commodity which is being exported/imported, Country is the place/country from which the commodity is being imported or to which the commodity is being exported, Unit is the quantity of commodity which is being measured in, Quantity is the amount of commodity being exported/imported, Value is the amount paid for the import or received from the export.

Who's it for? The dashboards are being created for the Government - Chief Data Officer of Data.Gov.in. The Ministry of commerce office is asking for a visualisation. Government wants these dashboards because they will analyse the visualisations to compare the historical data and will take decisions on the import and export based on that. It will also be useful for them to create documentation on the quantity being imported and exported for the 2 years so that they can decide on the quantity that can be purchased again in that financial year. They can also use these visualisations on social media to make people aware of their relationship with the countries.

Data Operations: Initially, there were 4 datasets. Import Data for 2021-22 and 2022-23. Also, Export data for 2021-2022 and 2022-23. So what I did in the excel is that I combined Import data of 2021-22 and 2022-23 into one and for export, I have combined 2021-22 and 2022-23 into one. So, while combining I created a new column for 'Year' and entered the respective years. This process was the same for Export data.

Features Comparison

1. Ease of Use

Tableau:

- Tableau's drag-and-drop interface is beginner-friendly, allowing users to create visualizations with minimal technical knowledge.
- The **"Show Me"** feature offers suggested chart types based on selected fields, saving time for beginners unfamiliar with data visualization best practices.
- Filters and calculated fields in Tableau are easy to configure, providing immediate visual feedback during development.

Power BI:

- Power BI's interface is slightly more complex due to its extensive customization options and multiple panes (Fields, Visualizations, Filters).
- The integration with Microsoft tools like Excel and SQL Server makes data import and transformation straightforward for advanced users.
- Tooltips and slicers are easier to configure in Power BI compared to Tableau, enhancing interactivity.

Example:
When creating the **Top 10 Commodities by Value** visualization, Tableau's workflow felt smoother as it automatically optimized the axes and formatting. In Power BI, I needed to manually adjust the layout and add conditional formatting for better presentation.

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2. Visualization Features

Tableau:

- **Pre-built Templates**: Tableau provides a variety of chart types, such as treemaps and scatter plots, with minimal setup.
- **Maps**: Tableau's built-in geographic visualization is highly intuitive. It automatically detects country names and generates maps with minimal configuration.
- **Storytelling**: Tableau's "Story" feature allows users to create interactive presentations within the dashboard.

Power BI:

- **Dynamic Visuals**: Power BI excels in offering highly customizable visuals. Conditional formatting, data bars, and gradient scales enhance data presentation.
- **Matrix Visualization**: Power BI’s matrix visual is more flexible than Tableau's equivalent, allowing subtotals, drill-through, and better formatting.
- **Custom Visuals**: Power BI supports importing custom visuals from the marketplace, offering extended functionality.

Example:
While creating the **Trade Distribution by Country (Map)** visualization, Tableau automatically geo-coded the country names and rendered a map instantly. In Power BI, additional configuration was required to ensure the country field was recognized as geographic data.

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3. Advanced Functionalities

Tableau:

- **Calculated Fields**: Tableau supports calculated fields with a proprietary syntax, which is intuitive once understood but requires a learning curve for new users.
- **Built-in Analytics**: Adding trendlines, forecasts, and clustering is straightforward in Tableau's analytics pane, providing quick insights.
- **Interactivity**: Tableau's hover interactions are smoother and easier to configure for presenting data insights.

Power BI:

- **DAX (Data Analysis Expressions)**: Power BI's DAX language allows for complex calculations and measures, but it has a steeper learning curve compared to Tableau's calculated fields.
- **Data Modeling**: Power BI supports robust data modeling with relationships between multiple tables, which is ideal for complex datasets.
- **Integration with Microsoft Ecosystem**: Seamless integration with Excel, Azure, and SharePoint enhances its value for organizations using Microsoft products.

Example:
For the **Yearly Trade Trends** visualization, Tableau's built-in trendline feature allowed me to quickly identify patterns, whereas Power BI required additional steps, including creating DAX measures, to achieve similar results.

Challenges Faced

Tableau:

1. **License and Accessibility**: Tableau Public limits saving and sharing capabilities. The Pro version is costly for individual users.
2. **Formatting Limitations**: Customizing fonts, colors, and tooltips was not as extensive as in Power BI.
3. **Data Processing**: Tableau relies on pre-cleaned datasets as it has limited built-in data transformation capabilities compared to Power BI.

Power BI:

1. **Performance on Large Datasets**: The dashboard occasionally lagged when handling large datasets, especially when multiple slicers were applied.
2. **Complex UI for Beginners**: The abundance of formatting and customization options can be overwhelming.
3. **Geo-Coding Issues**: Configuring maps required manually specifying the geographic data type for fields like Country and State.

Reflection on the Creation Process

Steps Taken:

1. Imported the cleaned dataset into Tableau and Power BI.
2. Created the following visualizations for comparative analysis:
    - **Top 10 Commodities by Value** (Bar Chart)
    - **Trade Distribution by Country** (Map)
    - **Yearly Trade Trends** (Line Chart)
    - **Commodity Contribution to Trade Value** (Clustered Bar Chart)
    - **Country-wise Export, Import, and Total Trade Values** (Matrix/Table)
3. Built interactive dashboards:
    - Tableau's dashboard creation process was faster due to its built-in layout optimization.
    - Power BI allowed more customization, especially for slicers and filters.
4. Added KPIs to the dashboards for high-level insights:
    - Tableau required creating a separate sheet for KPIs.
    - Power BI allowed direct integration of KPIs into the dashboard.

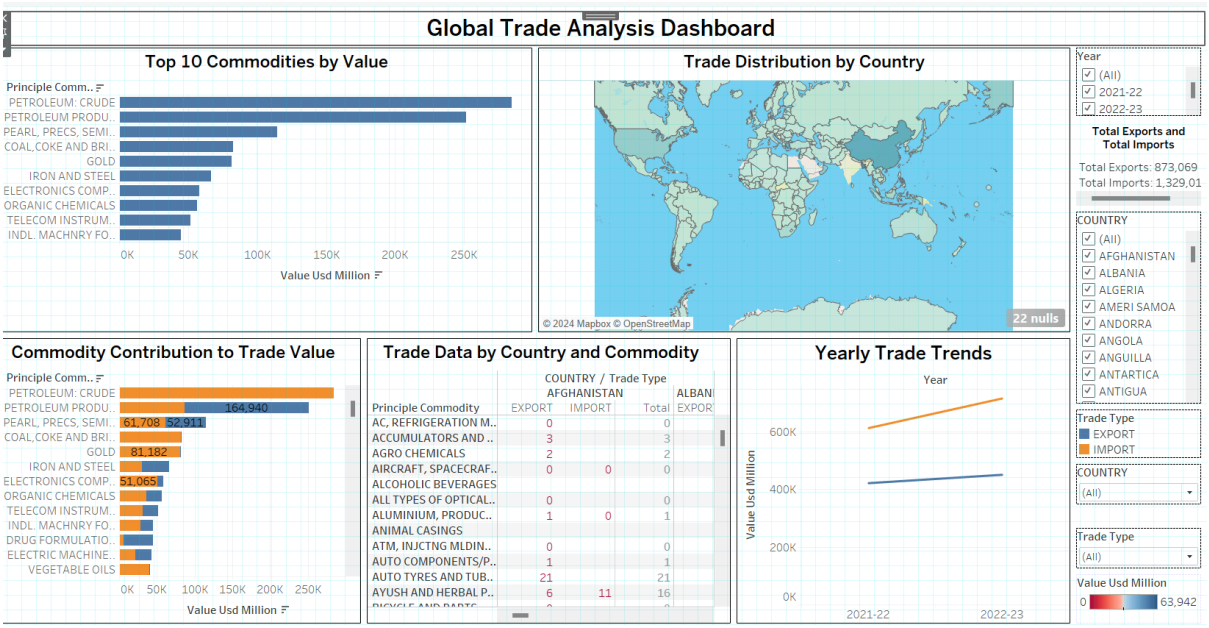
Insights Gained:

- Tableau is ideal for exploratory analysis and quick visualizations.
- Power BI is better suited for detailed reporting and integration with larger datasets.
- Both tools are powerful, but their effectiveness depends on the use case and user expertise.

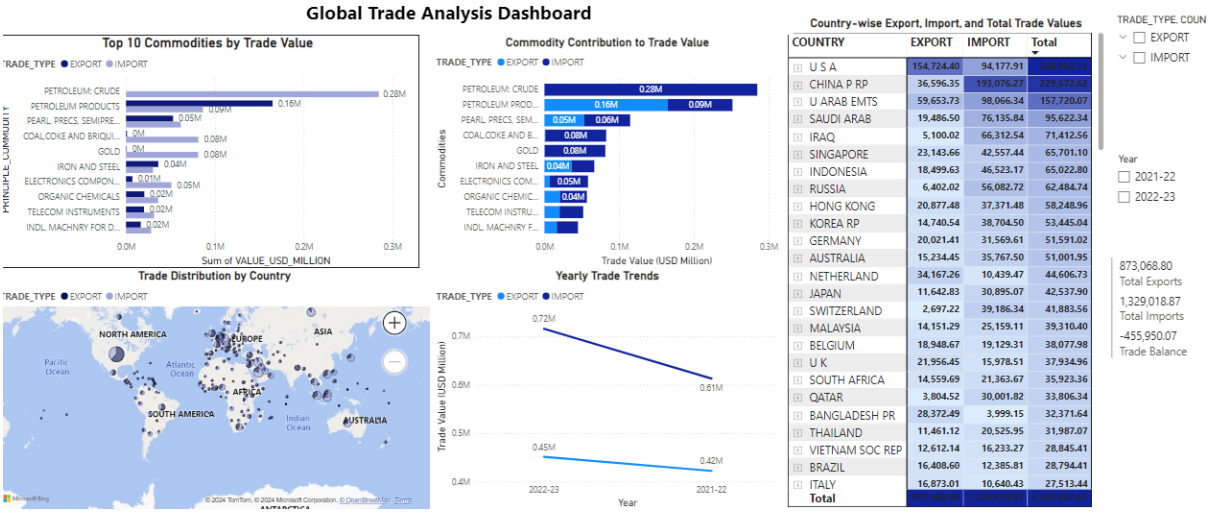
Conclusion and Recommendation

Both Tableau and Power BI are premium applications for data visualization; however, they have targeted different groups:

- **Tableau**: Tableau is even better suited for core competencies of analysts in exploratory data visualization and storytelling due to the intuitive interface combined with graphically stunning charts.



- **Power BI**: Best for business users who require detailed reports and integration with other Microsoft tools. Its extensive formatting options and DAX capabilities make it a robust choice for complex analyses.



For this assignment, Power BI provided better customization options, while Tableau excelled in creating visually compelling dashboards quickly. My recommendation is to choose Tableau for smaller, visually impactful projects and Power BI for enterprise-level reporting.