A Project Report On

STUDYING NON-TARIFF MEASURES BETWEEN COUNTRIES USING OXCIS DATA

By Team: **BISTRO'S**

WSU ID:	NAME:	E-MAILS:
E359C848	Divya Ravipati	E359C848@wichita.edu
F233Z974	Vinay Chowdari Mandava	F233Z974@wichita.edu
G679k957	Akhil Bollu	G679k957@wichita.edu
Q684A655	Ravikiran Nallamothu	Q684A655@wichita.edu
R528H427	Lokesh Neela	R528H427@wichita.edu
W498y454	Sirisha Kurapati	W498y454@wichita.edu

Submitted to

Fujian Yan

CS 896 Capstone Project in Data Science, TR 14:00 -15:15

School of Computing Department

Wichita State University

ABSTRACT

Our objective is to create a dashboard that shows the connections between reporters (countries) and their partners (groups of countries) through non-tariff measures (NTMs) involved in trade, along with the types of sectors and NTMs involved in this global network. The dashboard will provide a comprehensive view of NTMs, enabling us to study them comprehensively and gain insights into how trade relationships are formed between countries. By analysing the relationships between countries and the types of NTMs involved,we can obtain a better understanding of the impact of NTMs on trade and economic growth. Ultimately, this comprehensive dashboard will assist policymakers in making informed decisions regarding trade and economic cooperation.

INTRODUCTION

The study of non-tariff measures (NTMs) and their impact on trade and economic growth is a complex and nuanced field. To comprehensively understand the global network of NTMs, Oxford University researchers gathered data on trade between different countries, creating the OXCIS Dataset. Our goal is to develop a dashboard that presents the linkages between countries and groups of countries with applied NTMs, including the types of sectors and NTMs involved, using the OXCIS Dataset and visualizing it with Power BI, a powerful data visualization tool.

By analysing the relationships between countries and the types of NTMs involved,we can gain insights into the drivers of NTM formation, potential impacts on trade flows, and areas for policy intervention. The dashboard provides a holistic view of the global NTM network, enabling researchers to identify patterns, trends, and potential areas for policy intervention.

Furthermore, policymakers and businesses could use the dashboard to make informed decisions about cross-border trade and investment. With its real-time data feeds and flexible analysis options, this dashboard could be a valuable tool for studying and understanding the global network of NTMs, providing insights into their formation, impact, and potential policy responses.

Non-tariff measures (NTMs):

Non-tariff measures (NTMs) are a type of trade barrier that countries may use to regulate or restrict imports and exports. Unlike tariffs, which are taxes on imports or exports, NTMs are regulatory measures that aim to protect public health, safety, or the environment, or to promote economic development.

NTMs can take many forms, including technical regulations, standards, licensing requirements, and quotas. For example, a country may require that imported goods meet certain safety or quality standards, or that importers obtain a special license before they can import certain products.

While NTMs can serve important public policy goals, they can also have a significant impact on trade flows and can be used as a form of protectionism. As a result, many countries and international organizations have worked to develop rules and guidelines to ensure that NTMs are used in a transparent and non-discriminatory manner, and do not unduly restrict trade.

NTM Codes:

NTM Codes are a standardized system developed by the United Nations Conference on Trade and Development (UNCTAD) to classify and measure non-tariff measures (NTMs). These codes provide a common language and framework for comprehending the various types of NTMs and their impact on trade.

The use of NTM Codes is beneficial for several reasons. Firstly, they aid in standardizing the measurement and classification of NTMs, enabling comparisons between countries and over time. This is crucial for comprehending the impact of NTMs on trade flows and economic growth.

Secondly, NTM Codes offer a shared vocabulary for policymakers and researchers, enhancing communication and collaboration on NTM-related issues. This can facilitate the development of more effective policies and regulations, potentially decreasing trade costs and increasing market access for businesses.

In summary, the use of NTM Codes is a critical tool for comprehending the impact of NTMs on international trade and promoting policy coordination among countries. The codes provide a standardized framework for measuring and classifying NTMs, allowing for a more precise analysis of their effects on trade and the economy.

Scope of Work:

Based on the objective of creating a dashboard that visualizes the linkages between countries by application of non-tariff measures (NTMs), the scope of the work would typically involve the following steps:

1. **Data collection and preparation:** This involves gathering relevant data on NTMs, including NTM codes, country and sector classifications, and partner data. We are planning to use the OXCIS Dataset where it has multiple excel sheets which has information about trade by each country. Once collected, the data must be cleaned and transformed to ensure it is in a usable format.

2. **Data modelling and analysis:** This involves using Power BI's data modelling and analysis features to create relationships between the data tables, perform calculations, and create custom measures and calculated columns. The aim is to prepare the data for visualization and identify patterns and trends in trade by NTM application between countries.

3. **Dashboard design and creation:** This involves using Power BI's visualization features to design and create an interactive dashboard that visualizes the linkages between countries by application of NTMs. The dashboard should include a range of charts, tables, and other visualizations that provide insights into the types of NTMs involved and the sectors affected. We are planning to select exclusive set of variables from all the excel sheets which are crucial for the project's objective.

4. **Testing and Analysis:** This involve testing the dashboard to ensure it is functioning correctly and providing accurate insights into the global network of NTMs. Feedback may be sought from the Professor to ensure the dashboard is meeting the objective of our project and its expectations. After that analysing the visual patterns from the dashboard and giving insights about the NTM codes and their importance.

Overall, the scope of the work for creating a Power BI dashboard to visualize the linkages between countries by application of NTMs is a comprehensive process that involves data collection, preparation, modelling, analysis, dashboard design, testing, and deployment.

RELATED WORK

Non-tariff measures are policy measures that can potentially have an impact on international trade. They do not relate to the import tariff but can have a significant impact on the trade practice. NTMs are usually formed as regulations or policies with many diversions of intention, such as lowering trade, achieving public policy goals, applying specific conditions of price (such as price-control measures), quantity (such as quotas), or regulatory measure, etc.

UNCTAD (2018) mentioned that the increasing prevalence of NTMs during the last decade has also triggered a demand for more transparency. Hence, the uncertainty arises from the minimum information on NTMs that lean to reinforce the perception of their harmful effects.

NTMs are divided into a specific classification to differentiate them from one and another. The classification is formed by a specific group based on their characteristics. For instance, hard measures are given for price and quantity control measures, and threat measures are for anti-dumping and safeguards. The more specific characteristics of NTMs are Sanitary and Phytosanitary (SPS) standard, Technical Barriers to Trades (TBT), export measures, trade-related investment measures, distribution restrictions, restrictions on post-sales services, subsidies, measures related to intellectual property rights and rules of origin. Different forms of NTMs are applied to each of these groups.

INTRODUCTION TO POWER BI

3.1 Power BI:

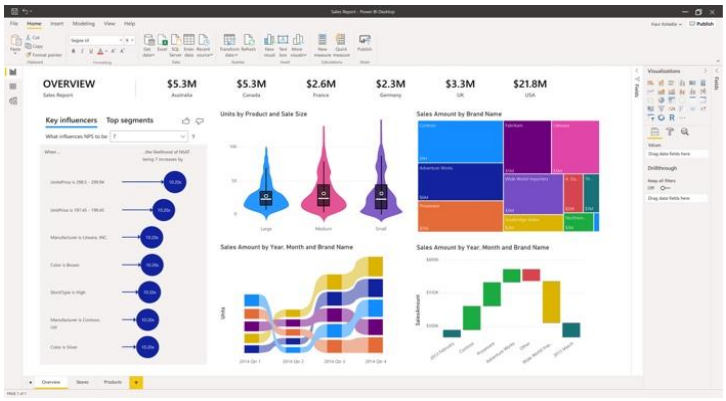
Power BI is a data visualization and business intelligence tool developed by Microsoft that enables users to connect to different data sources, transform and manipulate data, and create interactive reports and dashboards. It offers various features such as data modelling, transformation, and creating visually appealing reports with charts, tables, and visualizations. Power BI also has advanced features like natural language queries, data alerts, and real-time collaboration. It is a powerful tool for gaining insights into data and making informed decisions, making it popular among businesses and individuals of all sizes.

We have chosen Power BI as it offers advantages over Tableau such as integration with Microsoft products, lower cost of ownership, ease of use, robust features, integration with cloud platforms, advanced analytics capabilities, and strong security features, making it a popular choice for businesses of all sizes. Its intuitive user interface and advanced analytics capabilities make it easier for users with limited technical expertise to create reports and dashboards.

Power BI is a versatile tool with various applications and uses, including business reporting, data analysis, data visualization, collaboration, data exploration, and cloud-based analytics. With its range of visualizations, collaboration features, and ability to perform complex data analysis, Power BI is a powerful tool for businesses looking to gain insights from their data and make informed decisions.

Overall, Power BI is a powerful tool for businesses that want to gain insights into their data and make informed decisions. Its ease of use, flexibility, and range of features make it a popular choice for businesses of all sizes.

Example for dashboard:

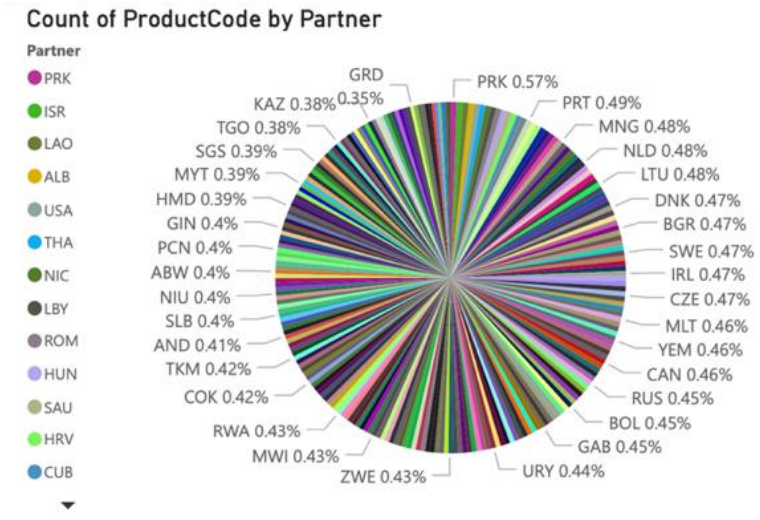


3.2 Slicer:

In Power BI, a slicer is a visual element that enables users to filter data in a report to display a subset of data. It allows users to select the desired data using a user-friendly interface, which is particularly helpful when dealing with large datasets. To use a slicer, users need to select the data they want to display in their report, choose the slicer type, customize the slicer and format it to match the report design. Users can interact with the slicer to filter data displayed in other visuals in the report. A slicer is a valuable tool in Power BI for allowing users to quickly filter data and identify patterns in the data.

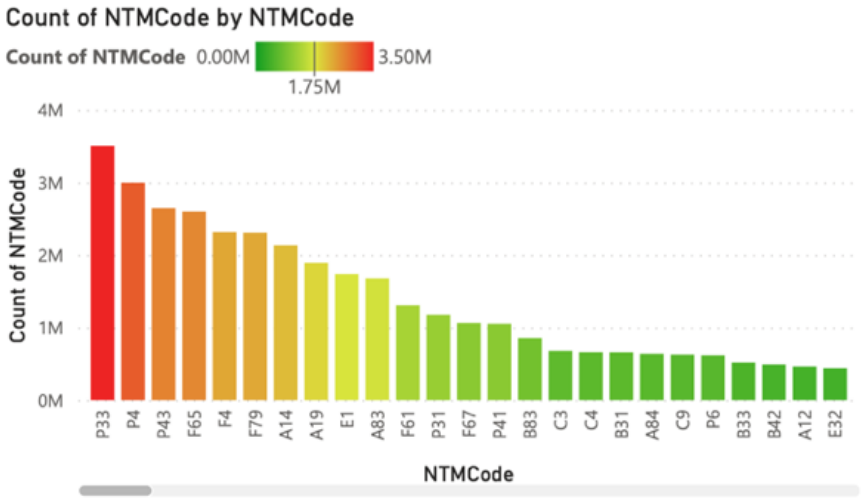
3.3 Pie Chart:

A pie chart in Power BI is a circular graph that represents data, where each segment represents a proportion of the whole. To create a pie chart, users need to select data and drag it onto the canvas, then customize it by changing colours, adding labels and adjusting size. Pie charts are useful for displaying data where parts contribute to a total and can show the relative sizes of different data categories. Power BI also offers other variations of the chart, including donut charts and pie charts with multiple rings, and they are a useful tool for displaying data in a clear and concise manner, allowing users to quickly identify trends and patterns. However, pie charts may be less effective when displaying data with many categories.



3.4 Bar Chart:

A bar chart in Power BI is a visual that displays data using rectangular bars of equal width and varying heights, which is useful for showing data grouped into categories. To create a bar chart in Power BI, users can select the data they want to display and drag it onto the canvas, select the bar chart icon from the Visualizations pane, and customize the chart by changing the colours of the bars, adding labels, adjusting the size, and adding a legend. Bar charts are a versatile tool for displaying data and helping users identify trends and patterns.



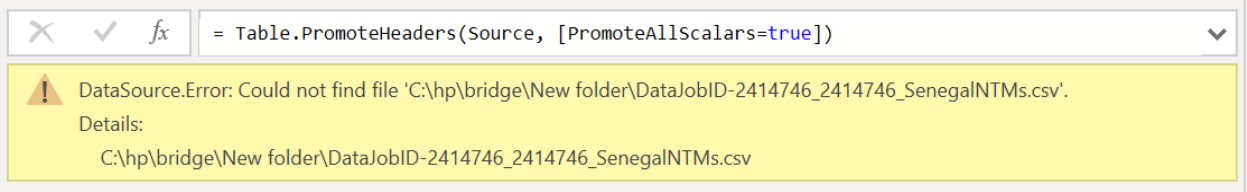
3.5 Count:

The count feature in Power BI allows users to count the number of values in each column or measure, providing insight into the size and frequency of certain values. To use it, users can select the column or measure they want to count, and create a count visual. The visual can be customized and used in conjunction with other features, such as slicers and charts. The count feature is useful for analysing customer demographics, tracking inventory levels, and monitoring website traffic, among other things. Overall, it is a simple yet essential tool for analysing and summarizing data in Power BI.

METHODOLOGY

Analysing the non-tariff measures (NTMs) data in Power BI can provide valuable insights into the trade relationships between countries and the types of NTMs involved in these relationships. In this project, the OXCIS dataset was loaded into Power BI, and various features of Power BI were used to analyse and visualize the data. And we have decided to use only specific variables like Reporter, Partner, NTM code, Product Code, Start Date from the excel sheets on which our objective relies.

Note: There are 84 Excel sheets of trade information which belongs to 84 different countries. Initially we started building the dashboard on web version of Power BI in a MacBook which has limited modules to work on. So, we had to move all the files to a Windows Laptop which supports Power BI in its app version with all modules. We might have missed Senegal's excel file.



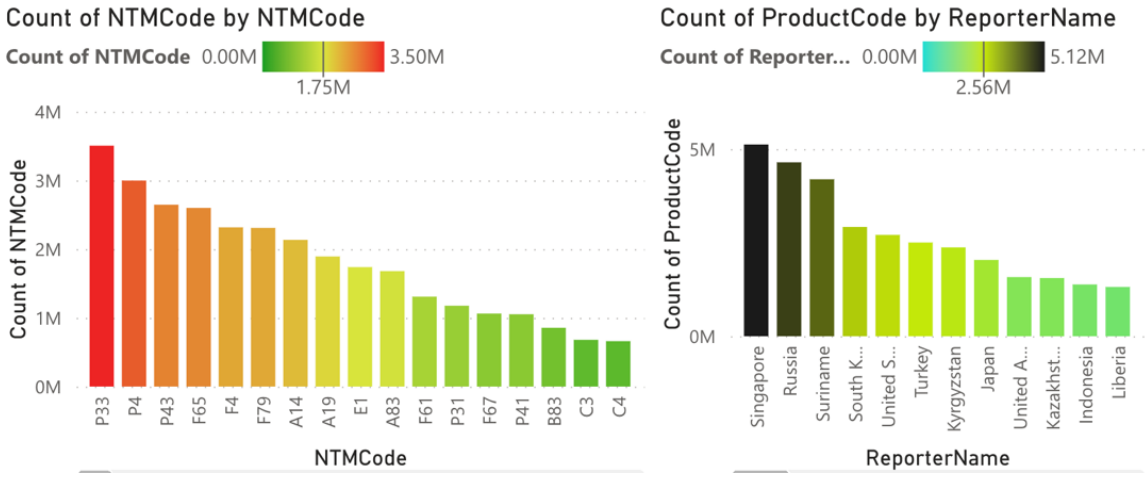
We tried hard to solve the issue, but we couldn't due to complexity of error because by the time we found out we have applied all the changes to the dashboard. So, our analysis is based only on 83 Countries only.

Using certain tools slicer, bar, pie, and Line charts, we can gain a comprehensive understanding of the NTMs involved in trade relationships between countries. This information can be used to inform policy decisions related to trade and economic cooperation, as well as to identify potential areas for further research.

For example, the data may show that certain NTMs are more prevalent in certain countries. This information could be used to develop targeted strategies for reducing barriers to trade in those areas. Alternatively, the data may reveal patterns in trade relationships that could be used to identify new opportunities for economic cooperation.

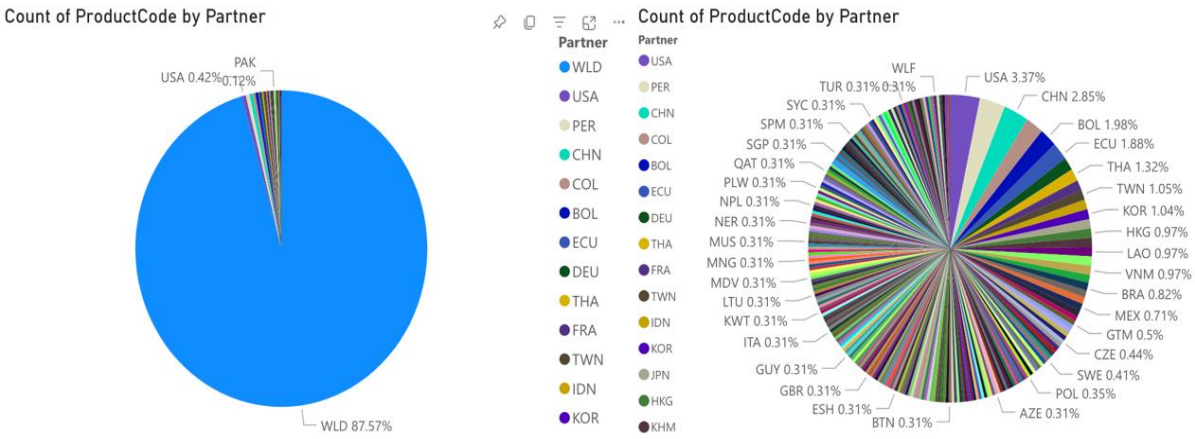
The use of Power BI in analysing the OXCIS dataset has allowed for a comprehensive understanding of the various non-tariff measures (NTMs) that exist between countries. The slicer feature in Power BI allows for easy selection of a particular country for analysis. This feature is particularly useful in identifying the various NTMs that exist between countries, as well as the sectors in which they are most prominent.

The bar chart visualization is an effective way of displaying the count of NTMs and NTM codes for each selected country. This feature provides a clear view of the frequency of NTMs in a particular sector, as well as the types of NTMs that exist between two countries. The use of this visualization can help identify potential barriers to trade, as well as areas for improvement in trade relations between countries.



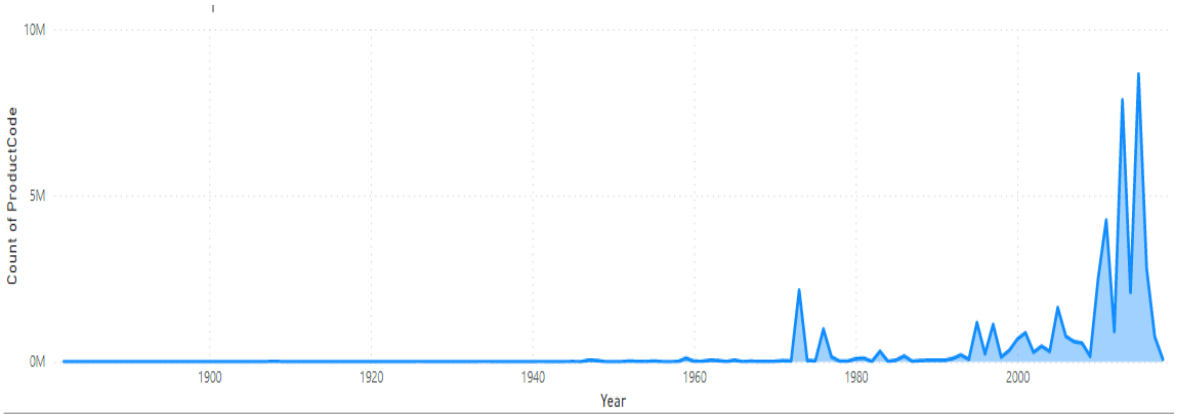
The pie chart feature in Power BI is useful in providing a snapshot of the percentage of countries trades with partners. This information can be used to identify the most active trading partners for a particular country, as well as the types of products or services that are most commonly traded. This information can be used to identify potential areas for growth in trade relations between countries.

Note: We have created another pie chart next to the original which shows the underperforming partners by removing the "WLD" which usually has major portion in almost all countries.



The count feature in Power BI is an essential tool for analysing and summarizing data. It allows users to count the number of values in each column or measure, providing insight into the size of a dataset or the frequency of certain values. In the context of the OXCIS dataset, the count feature can be used to identify the most common NTM codes and their frequency in trade relations between countries.

A line chart is an effective way to visualize the fluctuations of trade over time between countries and partners. The x-axis of the line chart represents the period, while the y-axis represents the value of trade. Each country or partner can be represented by a different line on the chart, making it easy to compare their performance over time.

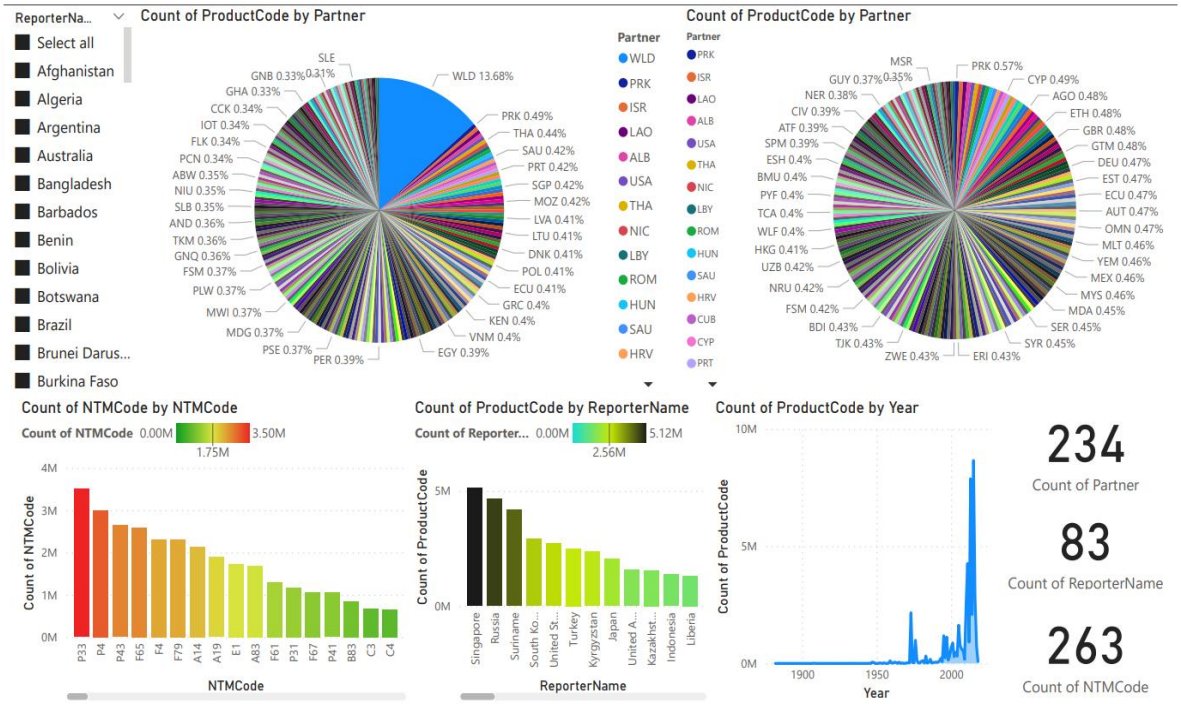


In conclusion, the use of Power BI in analysing the OXCIS dataset has provided valuable insights into the various NTMs that exist between countries. The combination of the slicer, bar chart, pie chart, and count features has allowed for a comprehensive understanding of the types of NTMs that exist between countries, as well as the sectors in which they are most prominent. The insights gained from this analysis can be used to identify potential barriers to trade and areas for improvement in trade relations between countries.

RESULTS

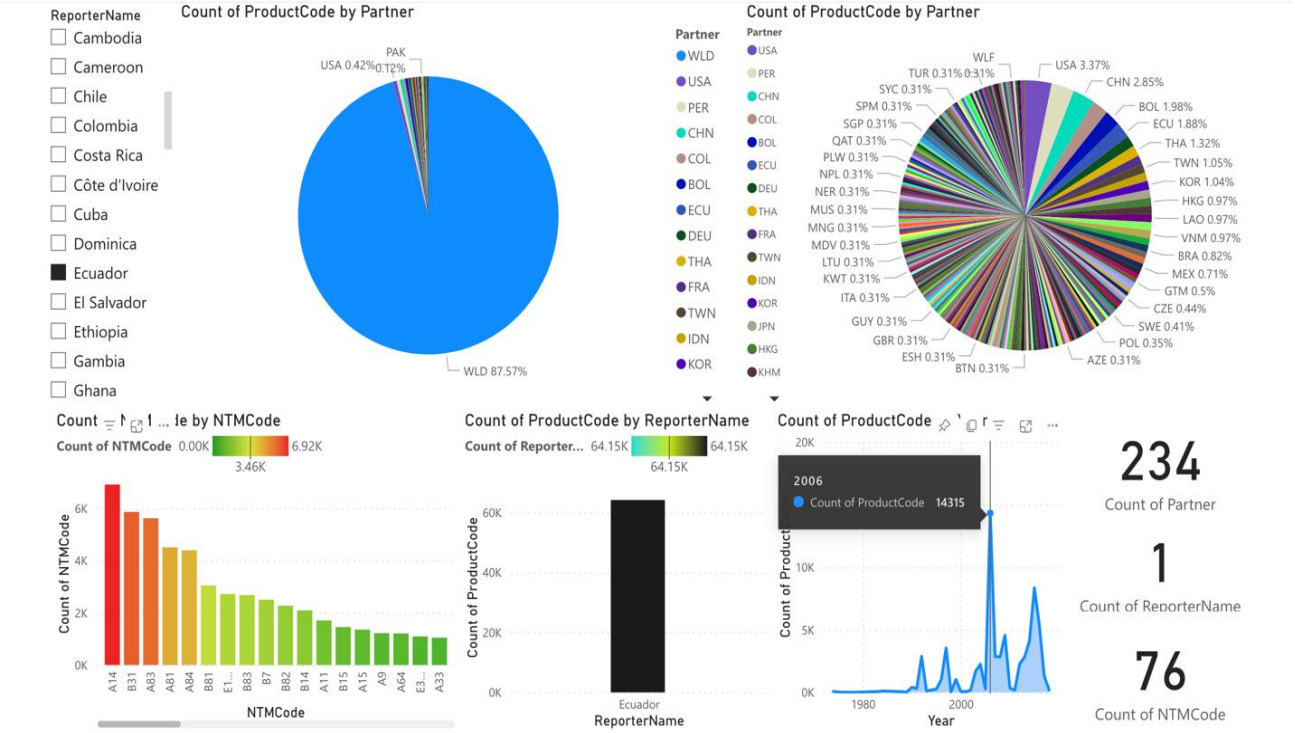
The analysis of the Combined Non-Tariff Measures (NTMs) dataset using Power BI provided valuable insights into the linkages between countries by application of NTMs. The use of slicers, bar charts, pie charts, and count measures allowed for a comprehensive analysis of the data, providing a clear picture of the distribution of NTMs across countries and sectors.

Dashboard with all selected Reporters:



The slicer tool was used to select specific countries, allowing for a detailed analysis of the NTMs implemented by those countries. The bar chart visualized the count of NTMs and NTM codes, providing insight into the types of measures used by each country. The pie chart displayed the percentage of countries' trades with partners, highlighting the extent of trade relationships between countries. And line chart helps us to understand the fluctuations of trade by reporter over the years.

Dashboard with selected Reporter to see its trade information:



The count measure was used to count the frequency of NTM codes, providing a detailed analysis of the types of measures used across sectors and countries. This information was valuable in identifying areas where NTMs may be hindering trade and where efforts can be made to reduce barriers to trade.

Understanding the Dashboard for Ecuador:

- ➔ Pie chats gives the information about its partners and their share in the trade with Ecuador. **WLD, USA, CHN etc..,** has done more trade respectively.
- ➔ Bar charts gives us the information about the NTM Codes which were applied majorly in the trade with its partners. **A14, B31, A83, A84, etc..,** were applied many times respectively in terms of product code.
- ➔ Line Chart shows the trade flow (**14315**)over the years where in the year **2006** Ecuador has highest trade.
- ➔ As per the Count tools, Ecuador applied **76 NTM codes** in trade with **234 different Partners**.

After the analysis, we sorted the NTM Codes which were applied during the trade based on count of Product Code and shortlisted top 50 in a Excel file.

In order to understand the terminology of all NTM Codes(P33, P4, P43, etc..,) and Partners(WLD, PRK, THA, etc..,) , we have gathered their information respectively. We have attached all those files in consolidated folder. The main reason to gather that information is because to understand the specific intention of that particular NTM Code and to know about the partner(country or firm) a reporter is in trade with. This helps us to analyse the data more meaningfully and helps us to process the insights of the analysis.

Overall, the use of Power BI allowed for a comprehensive analysis of the Combined NTMs dataset, providing valuable insights into the linkages between countries and the types of NTMs used in global trade.

CONCLUSION

The analysis of the Combined Non-Tariff Measures (NTMs) dataset using Power BI highlighted the importance of understanding the linkages between countries by application of NTMs.
The results of the analysis demonstrated the significant impact of NTMs on global trade and economic growth. The use of NTMs can hinder trade and create barriers for businesses looking to expand their reach into new markets. Therefore, efforts must be made to reduce these barriers and promote free and fair trade.

The use of Power BI in analysing the Combined NTMs dataset provided a powerful tool for policymakers and researchers in identifying areas for improvement and promoting economic cooperation between countries. By understanding the linkages between countries and the types of NTMs used, policymakers can make informed decisions to reduce barriers to trade and promote economic growth.

The analysis based upon the visualization can help a new partner who wants to do trade with a selected Country. Because we visualized all the history of trade information that particular country with different countries and firms. So, we can suggest that new partner to agree with certain NTM's during trade which were mostly used by that selected country with its previous partners over the years.

Overall, the analysis of the Combined NTMs dataset using Power BI underscores the importance of data-driven analysis in promoting economic cooperation and reducing barriers to trade.

REFERENCES

- APEC Business Advisory Council (ABAC).2016. Non-Tariff Barriers in Agriculture and Food Trade in APEC: Business Perspectives on Impacts and Solutions. University of Southern California, Marshall School of Business: 2016.
- Armington , P. S. 1969. "A Theory of Demand for Products Distinguished by Place of Production,"International Monetary Fund Staff Papers 16, 159–178
- Cadot, O., Asprilla, A., Gourdon, J., Knebel, C., & Peters, R. (2015). Non-Tariff Measures: a Methodology for Data Analysis. Policy Issues in International Trade and Commodities Study Series, 69.
- Cadot, O. and L.Y. Ing (2015), 'Non-Tariff Measures and Harmonization: Issues for the RCEP', Economic Research Institute for ASEAN and East Asia Discussion Paper, No. 2015-61. Jakarta: Economic Research Institute for ASEAN and East Asia. Available at: http://www.eria.org/ERIA-DP-2015-61.pdf
- De Melo, J. 1998. CGE Models for The Analysis of Trade Policy in Developing Countries. Policy Research Working Paper Series 3, The World Bank.
- Dixon, P., B. Parmenter, A. Powell and P. Wilcoxen 1992, Notes and Problems in Applied General Equilibrium Analysis, North Holland.
- Doan, T. and S. Buban (2019), 'Managing Non-tariff Measures in ASEAN', in Intal, P. and M. Pangestu, Integrated and Connected Seamless ASEAN Economic Community, Jakarta, ERIA, pp. 21–33
- Ederington, J., & Ruta, M. (2016). Nontariff Measures and the World Trading System. May, 211–277. https://doi.org/10.1016/bs.hescop.2016.04.010
- Grübler et.al. 2016. Assessing the Impact of Non-Tariff Measures on Imports Available at: https://cepr.org/sites/default/files/2486_GRUEBLER%20-%20Assessing%20the%20Impacy%20of%20NTMs%20on%20Imports.pdf
- Gourdon, Julien. 2014. CPEE NTM-MAP: A Toll for Assessing the Economic Impact of Non-Tariff Measures.CEPII Working Paper 2014.
- Habib, Dhrgam S. 2019. Gravity Model for Import Flow – A Case Of India's Oil And Non-Oil Imports From The Opec Cartel. Available at: http://www.jcreview.com/fulltext/197-1577441950.pdf