Coffee Uncovered:
A Closer Looked at the Global Coffee Industry

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1. Contributions

Tableau
- The world map of coffee export - Fu-Hsin Liao
- The world map of coffee import - Yin-Kai Huang
- The line chart of coffee export - Dieu-Anh Le
- The line chart of coffee import - Yin-Kai Huang
- The pie chart of coffee import - Dieu-Anh Le
- The stacked-bar of coffee import - Yin-Kai Huang
- Combination of all charts - Dieu-Anh Le

Sankey graph
- Data preprocessing - Jinho Lee
- Graph Drawing - Jinho Lee

Database
- Import data into Postgres using DBeaver and connect to Tableau - Fu-Hsin Liao

Documents Writing
- Dieu-Anh Le, Fu-Hsin Liao, Jinho Lee, Yin-Kai Huang

2. Introduction

In this project, we use Tableau and data from FAO[1] to build the statistics of coffee export and import amount in the top 20 coffee production countries. Coffee is one of the most widely traded commodities in the world, and its global trade has a significant impact on the sustainability of communities across the globe. Over the past decade, the global coffee trade has generally shown an increasing trend, with Brazil, Vietnam, Colombia, Indonesia, and Ethiopia leading the way as major players in the coffee trading market. Along with emerging markets, the rising demand for specialty coffee has contributed to increased coffee imports in some regions. However, coffee production and importation are impacted by various factors, such as land, water, climate, and transportation routes, which can have implications for cost reduction and fair trade practices. Furthermore, the post-COVID-19 era has added additional complexities and fluctuations in the global economy and other social and political issues affecting coffee trading, creating fascinating research opportunities for those interested in sustainable coffee trade.

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[1] https://www.fao.org/faostat/en/#data

3. Motivation

The majority of the adult population, especially graduate students, relies on coffee to go through their studies. During Covid-19, severe lockdowns caused people's lifestyles to change. Some wake up early with a cup of coffee to boost the day. Others were stressed and coffee helped them relieve the stress. In other words, coffee is an indispensable part of our everyday functioning. Besides, we observe a boom in the local coffee shop business model compared to franchises, we see more support from people in these coffee shops too. Therefore we want to look into the trading aspect of coffee to see if there are any changes to make coffee more affordable for local businesses to compete against larger franchises.

4. Mastery of Tools and Algorithm

First, we used PostgreSQL to filter out the raw dataset obtained from the FAO. Then, we use Sankey to create an overview of the dataset and how the importers relate to the exporters, which allows us to filter out some of the major countries. Next, we once again filter out these data and take a closer look at these specific nations using the tools Tableau offers. This software also gives us the ability to see the interaction between data. For instance, if we select a country in the world map, it filters out the corresponding country's information from the other chart that we were creating, allowing a more comprehensive view of the nation's specific data.

We used a Sankey diagram to show a flow from one set of values to another. In the Sankey diagram, the connected items are called nodes, and the connections are called links. In this project, the nodes represent each country, and the links represent the amount of coffee beans traded. To draw this diagram, we used the '*Node-Link Tree algorithm*'. It creates a tree structure of the nodes, assigns weights to the links based on the magnitude of the flow, and iteratively assigns positions to each node and link in the tree.

5. Findings

Some finding from the export side([link](#)):
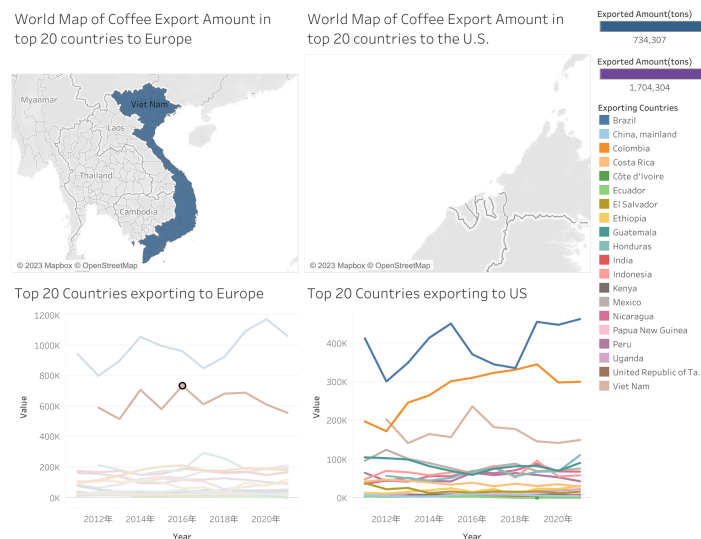
1. Among the top 20 exporter of coffee, there's a significant difference between the top two producers and the rest. This reminds us of the saying "the rich got richer" in which countries which already excel in coffee production are becoming better at their job and so having a competitive advantage over other nations which are slower in the game.
2. Top countries exporting to EU countries are Brazil and Vietnam.
3. Top countries exporting to the US are Brazil and Colombia.
4. While Brazil dominates both charts, there is a small change in the second place. We suspect this is due to the consumer preference of the imported countries. For instance, consumers in the US prefers taste of Arabica more than Robusta coffee, which explains for the higher of import quantity from Colombia (Arabica) than from Vietnam (Robusta)

Some finding from the import side([link](#)):
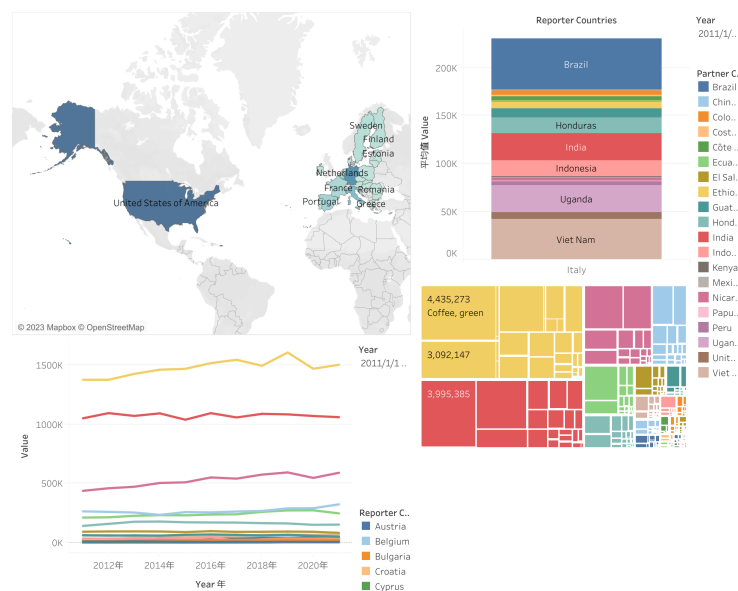
1. Brazil and Honduras have gained prominence as dominant players in Sweden's coffee business, signaling a shift in the country's coffee ingredient imports from multiple countries. This reflects changing dynamics in the Swedish coffee market, with potential implications for pricing, supply chains, and market trends
2. Vietnam holds a significant and noteworthy position in the coffee import market of Spain, being recognized as an important role in the country's coffee trade landscape.
3. Coffee imports to Italy are gradually increasing, indicating a growing reliance on imported coffee for its consumption patterns.
4. Uganda emerged as the primary coffee supplier for Italy during the COVID-19 pandemic period.
5. The United States, Italy, and Germany rank as the three largest coffee-importing countries based on their substantial coffee import volumes.

6. Future Works

Our next step will be to bring our findings to the local franchises and help them to improve their business strategies when choosing their coffee beans upstream. As an improvement of our analysis, future research could take a closer look at differences in nutrition content harvested from the top 20 coffee producers globally to see if the better quality explains the significant difference in trade values.

In addition, if we take a closer look at the years 2019-2021, we observe an increase in coffee green production. Our hypothesis is that during lock down, some local regions observed a positive improvement in the climate[2], which possibly favored coffee agriculture and so increased production. Being a pantry staple explained the increase in import as well. However, this remains a hypothesis and it would be interesting to conduct more detailed research on this.

6.1 Concerns over future production and sustainability

We examined coffee trade volumes between 2012 and 2021 and found that coffee-related trade volumes have increased significantly over the period of time. As the global population continues to grow and become more affluent, the demand for coffee is expected to increase further, which could put additional pressure on coffee production. According to the International Coffee Organization (ICO), global coffee consumption is expected to continue growing at an average rate of 1.2% per year in the coming years. Therefore, there may come a time when the demand for coffee beans is bigger than the production of coffee beans. This is because coffee is a gourmet food, so demand could increase in emerging countries with rising standards of living. To address these concerns, many coffee producers and industry stakeholders are taking steps to improve the sustainability and resilience of coffee production, such as by investing in research and development, promoting sustainable agricultural practices, and supporting farmers with training and resources.

7. Conclusion

In conclusion, the global coffee trade plays a crucial role in the sustainability of communities around the world. Despite all the oscillations, coffee trading has generally shown an upward trend in the past decade, driven by rising demand for specialty coffee in emerging markets. Coffee production is impacted by various factors, including land, water, climate, and transportation routes, while coffee importers face decisions on cost reduction versus supporting fair trade practices. The post-COVID-19 era has added additional complexities and fluctuations in the global economy and other social and political issues affecting coffee trading, presenting fascinating research opportunities. Our work is just a very small contribution in moving towards a more sustainable trade in the coffee industry.

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[2]

https://climate.nasa.gov/news/3129/emission-reductions-from-pandemic-had-unexpected-effects-on-atmosphere/