**Global Coffee Consumption Trends**

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**Introduction**

Coffee, a symbol of morning rituals and coffeehouse culture, is more than just a drink. It embodies a story of interconnectedness—a narrative woven through the fabrics of societies and economies. One of the most commonly consumed beverages in the world, coffee has had an enormous impact on economy, culture, and agriculture over the years. We will look into trends in globally coffee consumption in this research. We will explore the dataset that forms the basis of our analysis, explain the variables and measures within it, outline our initial expectations, identify any missing elements, and provide context through relevant research. Furthermore, we will present our initial argument regarding global coffee consumption trends. The selection of this dataset was no arbitrary choice. It was motivated by the recognition of coffee's ubiquitous presence in our lives and the profound insights it can offer.

**Domain and Data Source**

The domain for this analysis lies in the field of economics, specifically within the sector of food and beverage consumption. We obtained our dataset from the International Coffee Organization (ICO), a reputable source known for collecting comprehensive data on coffee production and consumption worldwide. This dataset was chosen for its rich tapestry of information.

**Dataset Choices**

We chose this dataset from the ICO due to its credibility and extensive coverage of global coffee consumption patterns. The dataset encompasses data from multiple years (1990 – 2019) and regions, making it suitable for a comprehensive analysis of global trends.

**Variable and Measures**

Our dataset includes the following key variables:

1. **Country:** The name of the country or region under consideration.
2. **Year:** The year for which coffee consumption data is recorded, as of our dataset it’s between 1990 – 2019.
3. **Coffee Consumption (in thousands 60-kg bags):** A measure of the total coffee consumption within a specific country for a given year.
4. **Coffee Type:** Categorization of coffee into types such as Arabica, Robusta, and others.
5. **Price Indicators:** An indicator of coffee price fluctuations or trends over time and types of coffee’s price over time.
6. **Inventories (in thousands 60-kg bags):** The amount of coffee beans held in reserve or storage.
7. **Production (in thousands 60-kg bags):** The total coffee production within a specific country for a given year.
8. **Exports (in thousands 60-kg bags):** The quantity of coffee exported by a country.
9. **Imports (in thousands 60-kg bags):** The quantity of coffee imported by a country.

(Angola, Bolivia (Plurinational State of), Brazil, Burundi, Cameroon, Central African Republic, Colombia, Congo, Costa Rica, Côte d'Ivoire (Ivory Coast), Cuba, Democratic Republic of Congo, Dominican Republic, Ecuador, El Salvador, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guatemala, Guinea, Guyana, Haiti, Honduras, India, Indonesia, Jamaica, Kenya, Lao People's Democratic Republic, Liberia, Madagascar, Malawi, Mexico, Nepal, Nicaragua, Nigeria, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Rwanda, Sierra Leone, Sri Lanka, Tanzania, Thailand, Timor-Leste, Togo, Trinidad & Tobago, Uganda, Venezuela, Viet Nam, Yemen, Zambia, Zimbabwe)

The dataset includes a range of countries and regions important to the global coffee industry. They vary in terms of coffee production, consumption, and trade, representing various continents and climates where coffee is grown. Notable countries include Brazil, Colombia, Ethiopia, and many others, each with its unique role and significance in the coffee world.

Our dataset encompasses a wide range of crucial coffee-related information, including exports, imports, production, inventories, consumption, and indicator prices. However, to make this data suitable for visualization and exploratory data analysis (EDA), we recognize the need to incorporate additional details, such as trade information. Additionally, a critical step involves cleaning and transforming the dataset into a structured and organized format. Currently, the data is spread across individual Excel sheets with multiple years, which is not conducive to meaningful analysis or visualization. By aggregating and reformatting the data, we aim to unlock valuable insights into the complex dynamics of the coffee industry and facilitate comprehensive analyses.

**Exploratory Data Analysis**

**Data Preparation**

Checking for Zeros, Null Values, and Duplicates: We thoroughly examined the ‘Consumption’, ‘Imports’, ‘Exports’, ‘Production’ and ‘Inventory’ datasets for data quality issues. Fortunately, we didn't encounter any zero values or duplicates. However, null values were present in the every dataset, particularly in the early years. To address this, we applied forward-fill and interpolation methods to fill in the missing values. This ensured a complete and consistent dataset for analysis. We filled all those missing values with zero because the data is originally from the International Coffee Organization and we can’t just drop all those countries having null values. We used isnull( ) function to identify the null values and sum( ) function to calculate the null values present in the dataset.

In our data exploration, we embarked with a dataset that predominantly comprised numerical values spanning the years 1990 to 2019, accompanied by country labels. The simplicity of the dataset in terms of its structure allowed for an in-depth analysis. With a minimal need for data preprocessing, our primary task involved arranging the data in Excel to ensure it was readily loadable into Python for exploration. This straightforward process paved the way for an extensive examination of virtually every variable present in the dataset. We harnessed the power of Python's data manipulation and visualization libraries to derive valuable insights, offering a comprehensive understanding of coffee consumption, production, imports, and exports across various countries. This approach streamlined our exploration, enabling us to uncover compelling trends, correlations, and future research directions that can significantly benefit stakeholders in the global coffee industry.

**Visualization**

1. Trends in Importers Data over Time:

Visualization: Line plots were generated for individual countries to depict how their import quantities changed over the years.

Explanation: These line plots allowed us to track the import trends for each country. By visualizing the data over time, we could observe whether import quantities increased, decreased, or remained relatively stable.

1. Highest Consumption Country for Each Year:

Visualization: A bar chart was created to identify the highest consumption country for each year.

Explanation: This bar chart provided a clear annual snapshot of which country had the highest consumption. It allowed for a quick and easy understanding of consumption leadership each year.

1. Correlation Between Total Imports and Total Consumption:

Visualization: We calculated the correlation coefficient between total imports and total consumption for all countries and years.

Explanation: This statistical analysis helped us understand the relationship between total imports and total consumption. A positive correlation coefficient indicated that as imports increased, consumption tended to increase, while a negative coefficient would have suggested an inverse relationship.

1. Annual Growth Rate Plot: To gain deeper insights, we can calculate and visualize the annual growth rate of coffee consumption. This involves calculating the percentage change in consumption from one year to the next and plotting these growth rates over time.

Explanation: The annual growth rate plot helps us identify periods of significant change in coffee consumption. It allows us to pinpoint years when consumption increased or decreased rapidly.

1. Top 5 Countries with the Highest Coffee Consumption in 2019:

To identify the top 5 countries with the highest coffee consumption in 2019, we analyzed the 'consumption' dataset. These countries consumed the most coffee in that year, as measured in thousands of 60kg bags. Here are the top 5 countries:

Country 2019

34 United States of America 27309.950887

11 Germany 8670.044801

28 Japan 7550.821826

10 France 6192.440140

15 Italy 5469.078443

1. Identify Countries with the Highest Increase in Consumption:

We identified countries that experienced the highest increase in coffee consumption over the years by analyzing the calculated yearly growth rates.

Explanation: This analysis helped us pinpoint countries where coffee consumption has grown most rapidly. These countries might be of particular interest for further investigation.

| **Country** | **Change\_1990\_to\_2019** |
| --- | --- |
| **21** | Poland | 647.366599 |
| **32** | Tunisia | 403.151743 |
| **3** | Bulgaria | 315.655520 |
| **5** | Cyprus | 277.562320 |
| **14** | Ireland | 208.244181 |

In addition to the requested analyses, we also discovered several insights from the dataset. For example, we observed that certain countries consistently maintained high coffee consumption levels, while others experienced occasional spikes or declines. Additionally, we noticed some outliers in consumption, which might be attributed to unique factors influencing coffee habits in those countries.

These analyses and insights provide a comprehensive overview of coffee consumption trends, growth patterns, and distribution, offering valuable information for further exploration or decision-making related to the coffee industry.

**Observations**

1. Overall Increasing Trend: One noticeable trend is that coffee consumption has generally increased across most countries over the years. This indicates a growing global demand for coffee.
2. Regional Variations: There are regional variations in coffee consumption. Some European countries, such as Germany and France, consistently rank among the top consumers. In contrast, some Eastern European countries like Bulgaria have relatively lower consumption.
3. Outliers: There are countries that exhibit fluctuations and outliers in their consumption patterns. For example, Italy experienced a significant increase in coffee consumption from the late 1990s to early 2000s.
4. Yearly Growth: The yearly growth rates vary between countries. Some countries consistently demonstrate positive growth, while others exhibit occasional spikes or dips in consumption.
5. High Growth Countries: Countries like Austria, Luxembourg, and the Netherlands have experienced remarkable growth in coffee consumption in recent years. These countries could be potential areas for further exploration to understand the factors driving this growth.

**Subsets of Interest**

1. Top 5 Consumers in 2019: The top 5 countries with the highest coffee consumption in 2019 are particularly interesting. Understanding the factors contributing to their high consumption levels could provide insights into consumer preferences and market dynamics.
2. High Growth Countries: Countries with the highest annual consumption growth rates are worth exploring further. Investigating the reasons behind their rapid growth could reveal market opportunities or changing coffee cultures.
3. Countries with Fluctuations: Countries that exhibit irregular consumption patterns, such as spikes or declines, warrant further investigation. Determining the causes behind these fluctuations could inform marketing and distribution strategies.

**Further Exploration**

1. Overall Sales Trends: We will calculate the overall coffee sales by summing up production, imports, and subtracting exports. Identifying countries or regions with the highest sales volumes will be a top priority. This will provide us with insights into market dominance and potential opportunities for market expansion.
2. Consumption-to-Imports Ratio: Calculating the ratio of coffee consumption to imports for each country is on our radar. This ratio will reveal how efficiently the supply chain operates in different regions and help us identify areas where improvements can be made.
3. Exports vs. Consumption: We plan to compare coffee exports with domestic consumption figures. This analysis will pinpoint countries where domestic consumption significantly exceeds exports, shedding light on strong local coffee cultures or potentially underserved markets.
4. Price-Consumption Relationships: We will delve into the relationship between coffee prices and consumption. Understanding whether changes in prices have a significant impact on consumption patterns will be a crucial factor in our research.
5. Inventory Impact: Investigating how coffee inventories relate to production and consumption is on our agenda. We aim to comprehend how countries manage their coffee stockpiles and whether inventory levels influence market dynamics.
6. Production and Consumption Trends: Tracking the trends in coffee production and consumption over the years is a priority. We intend to identify countries where production has consistently outpaced consumption and vice versa.

**Conclusion**

In conclusion, our exploration of global coffee consumption trends has provided valuable insights into the intricate world of coffee. From the initial data preparation to the detailed visualizations and analyses, we've uncovered a multitude of interesting observations. Coffee consumption has shown an overall increasing trend, with regional variations, outliers, and varying yearly growth rates among countries. The top 5 consumers in 2019, high-growth countries, and those with consumption fluctuations have been identified as subsets of interest for further investigation.

As we move forward, our research will delve deeper into areas such as overall sales trends, consumption-to-imports ratios, exports vs. consumption, price-consumption relationships, inventory impact, and production and consumption trends. These additional analyses will help us gain a more comprehensive understanding of the coffee industry, its dynamics, and potential opportunities for market growth and improvement. Coffee, a global symbol of culture and commerce, continues to be a fascinating subject of study, weaving its story through the fabric of societies and economies. Through our research, we aim to shed light on the factors driving coffee consumption trends and contribute valuable knowledge to stakeholders in the coffee industry and beyond.

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