Analysis of Plastic Bottle Pollution: A Global Perspective

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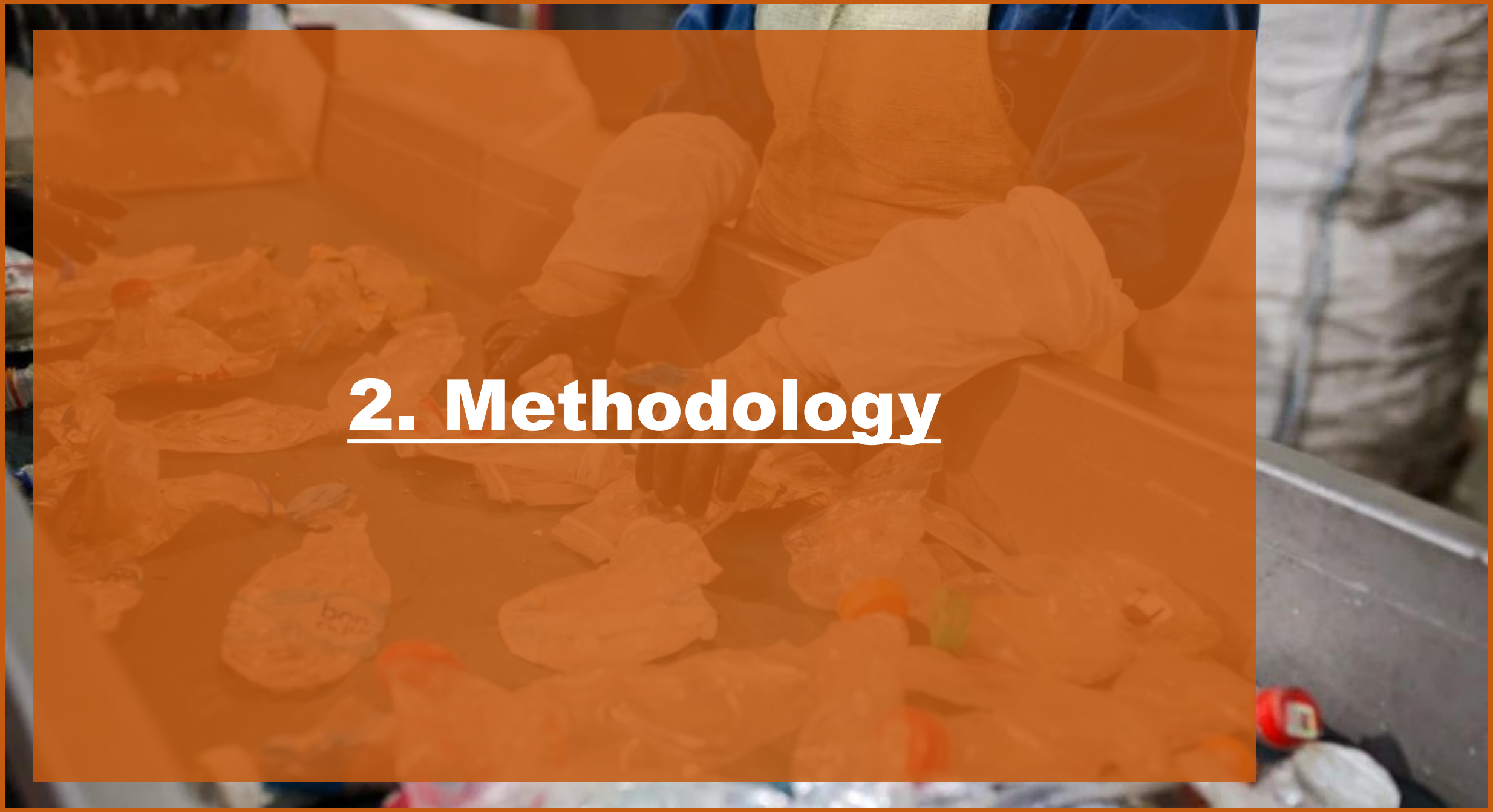
Overview/Introduction

Welcome to the 'Analysis of Plastic Bottle Pollution: A Global Perspective'! This project aims to analyze and visualize the impact of plastic bottle pollution on a global scale.
By exploring data related to bottle counts, bottle weight, and manufacturers, we aim to gain insights into the distribution and environmental impact of plastic bottles across different countries and regions. To facilitate data exploration and enhance understanding, we have developed an interactive dashboard that allows users to interact with the data through maps, graphs, and filters.

Problem Statement

Plastic bottle pollution has become a significant environmental concern worldwide, posing threats to ecosystems, wildlife, and human health. Understanding the patterns and distribution of plastic bottle pollution is crucial for devising effective strategies to mitigate its impact. This project aims to address the need for comprehensive analysis and visualization of plastic bottle pollution data, enabling the necessary government sectors dealing with environment and plastic bottle manufacturers to make informed decisions and take targeted actions to tackle this pressing issue.



2. Methodology

2.1 Data Collection

The project utilizes a dataset obtained from https://www.unwaste.io/data. which provides information on plastic bottle waste, including bottle count, bottle size, manufacturer details, and geographical location.

2.2 Data Analysis

The dataset is processed and analyzed using Python programming language and relevant data analysis libraries. Exploratory data analysis techniques are employed to gain insights into the distribution, trends, and patterns of plastic bottle pollution.

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3. Data Understanding

3.1 Dataset Description

The dataset comprises 33,007 rows and 10 columns. Each row represents a plastic bottle entry, while the columns provide information on product attributes, manufacturer details, country of origin, and bottle characteristics.

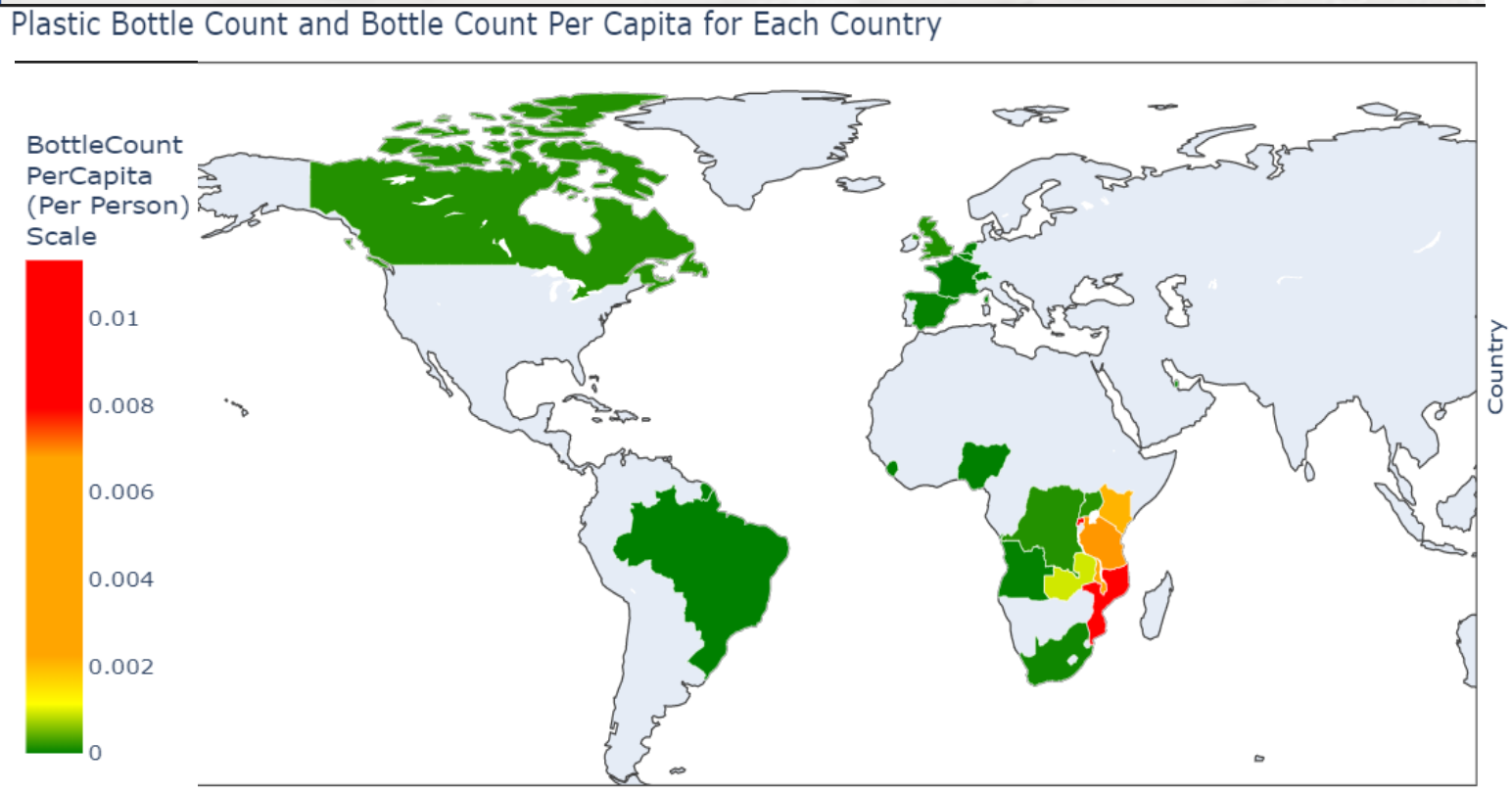
3.2 Column Descriptions

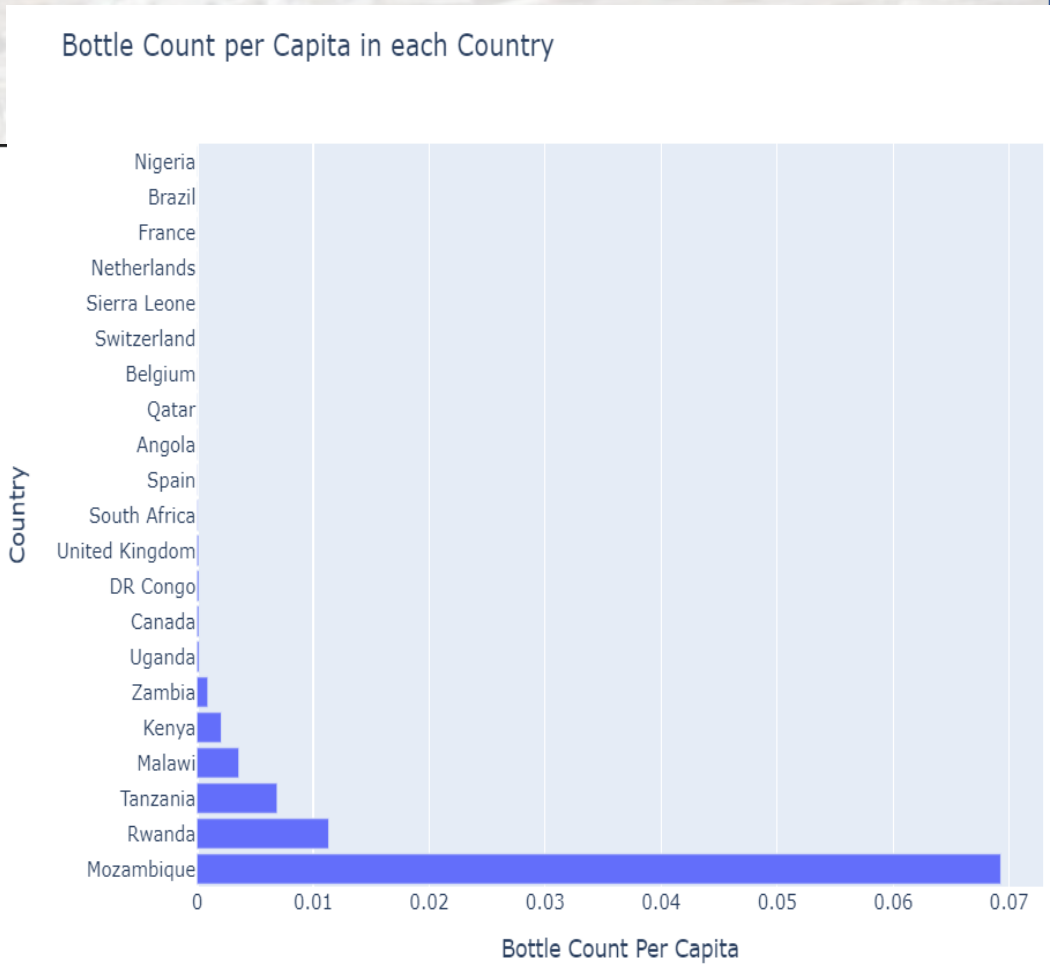
Product Barcode: A unique identifier assigned to each product for tracking purposes.
Product Label: The label or packaging of the product containing relevant information.
Product Size: The size or volume of the plastic bottle.
Brand Name: The brand associated with the product.
Manufacturer Country: The country where the manufacturer is located.
Manufacturer Name: The name of the manufacturer or company producing the plastic bottles.
Scan Country: The country where the scanning or data collection took place.
Data URL: The source URL or web address of the data.
Bottle Weight: The weight of the plastic bottle.
Bottle Count: The count or number of plastic bottles.

4. Findings and Analysis

4.1 Plastic Bottle Pollution per Capita

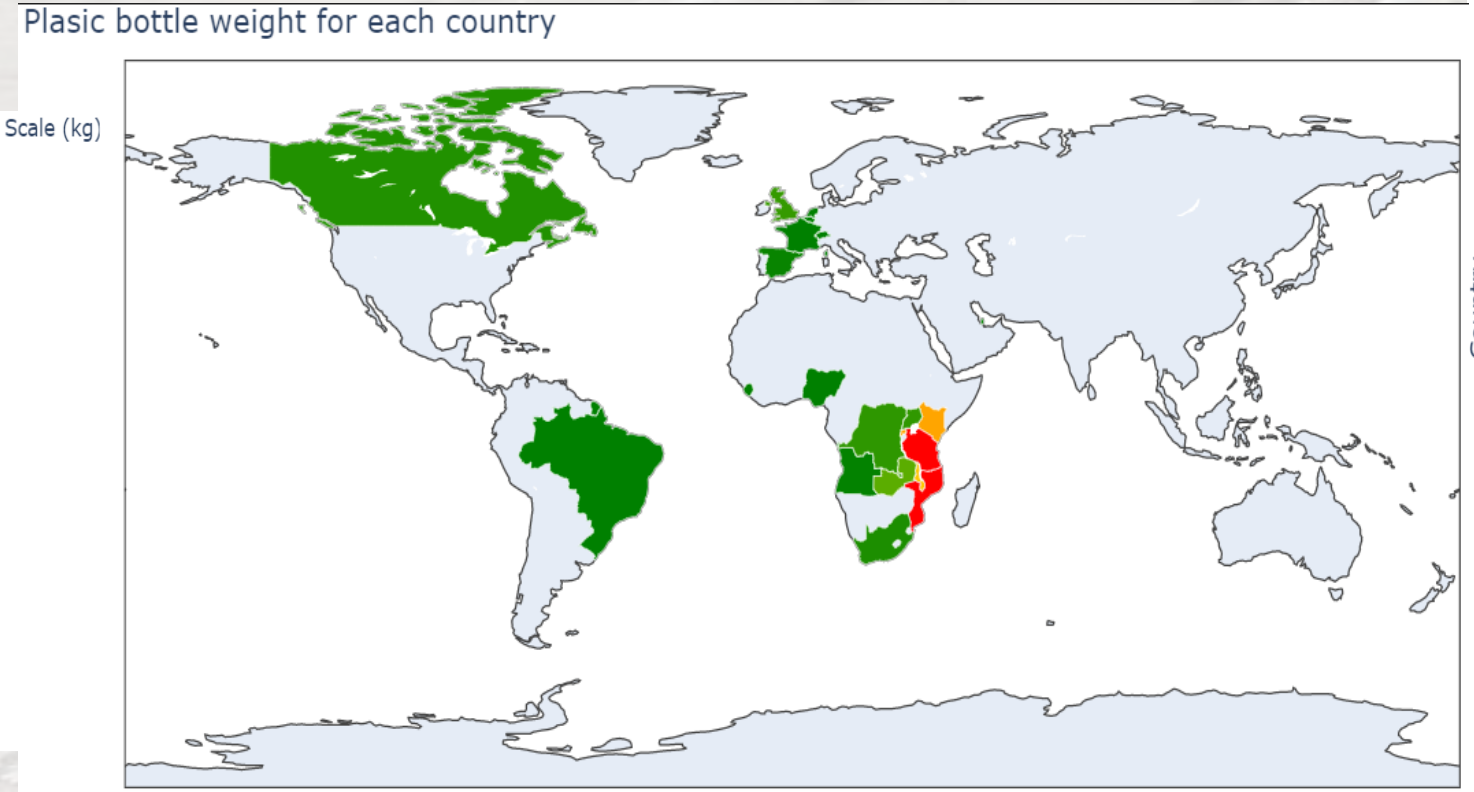
Through the analysis, it was observed that Mozambique had the highest number of plastic bottles polluting the environment per person, followed by Rwanda and Tanzania. Nigeria had the lowest number of plastic bottles per capita.

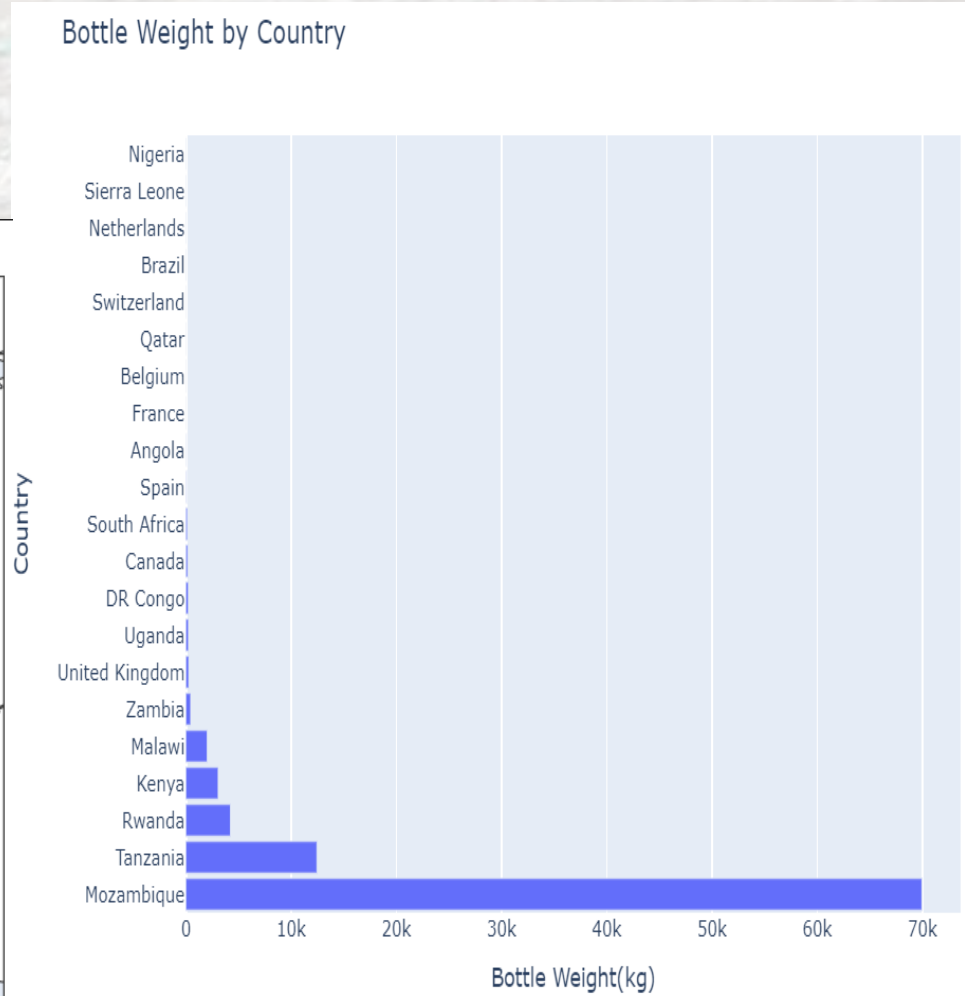




4.2 Plastic Bottle Weight in the Environment

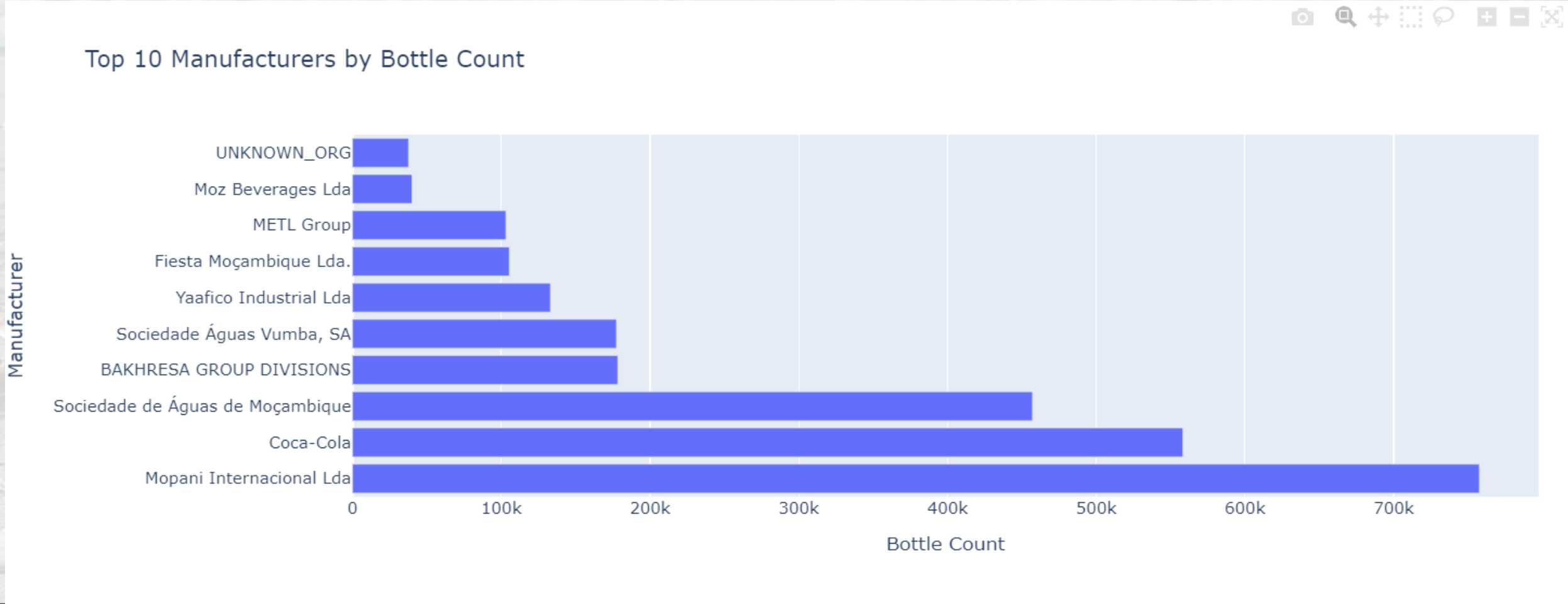
Mozambique emerged as the country with the highest amount of plastic bottle weight in the environment, followed by Tanzania, Rwanda, Kenya, and Malawi. Conversely, countries such as Netherlands, Sierra Leone, and Nigeria recorded the least amount of plastic bottle weight.





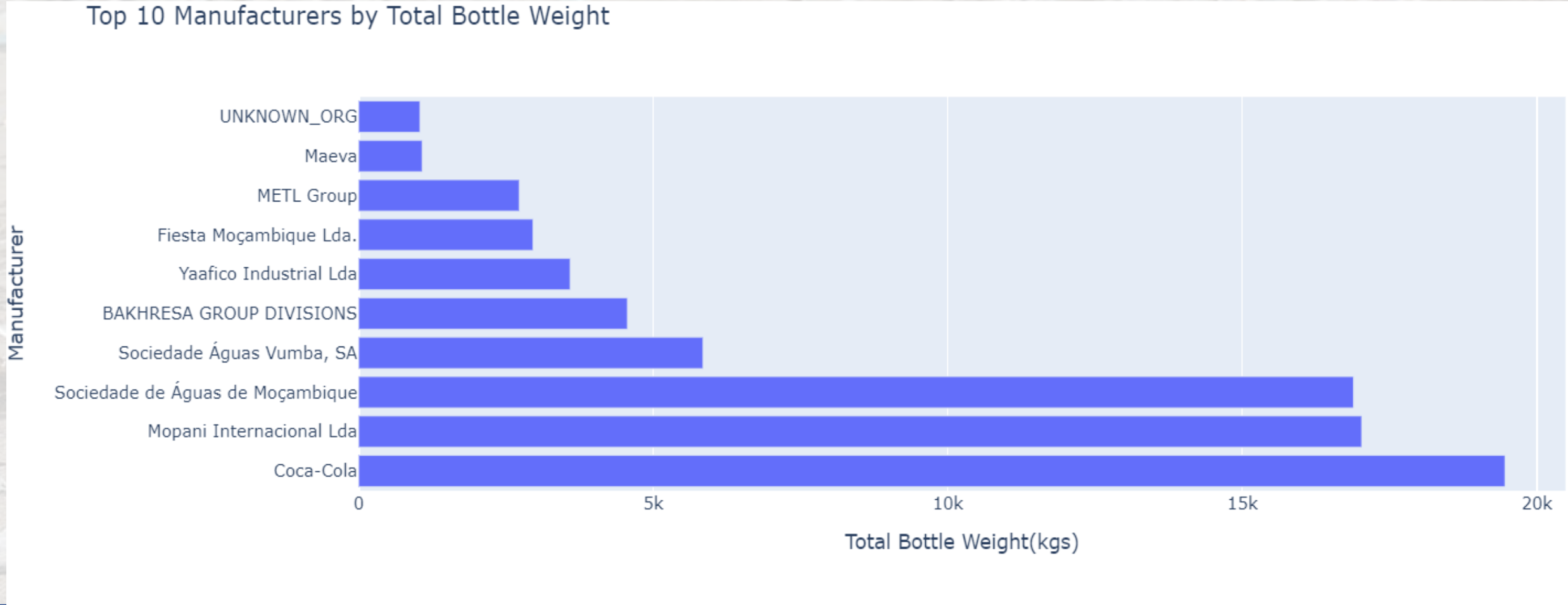
4.3 Top Manufacturers by Number of Plastic Bottles

Mopani Internacional Lda ranked as the highest manufacturer in terms of the number of plastic bottles polluting the environment, with a total of 757.6k plastic bottles. Coca-Cola followed closely with 558.3k plastic bottles, and Sociedade de Águas de Moçambique ranked third with 457.16k plastic bottles.



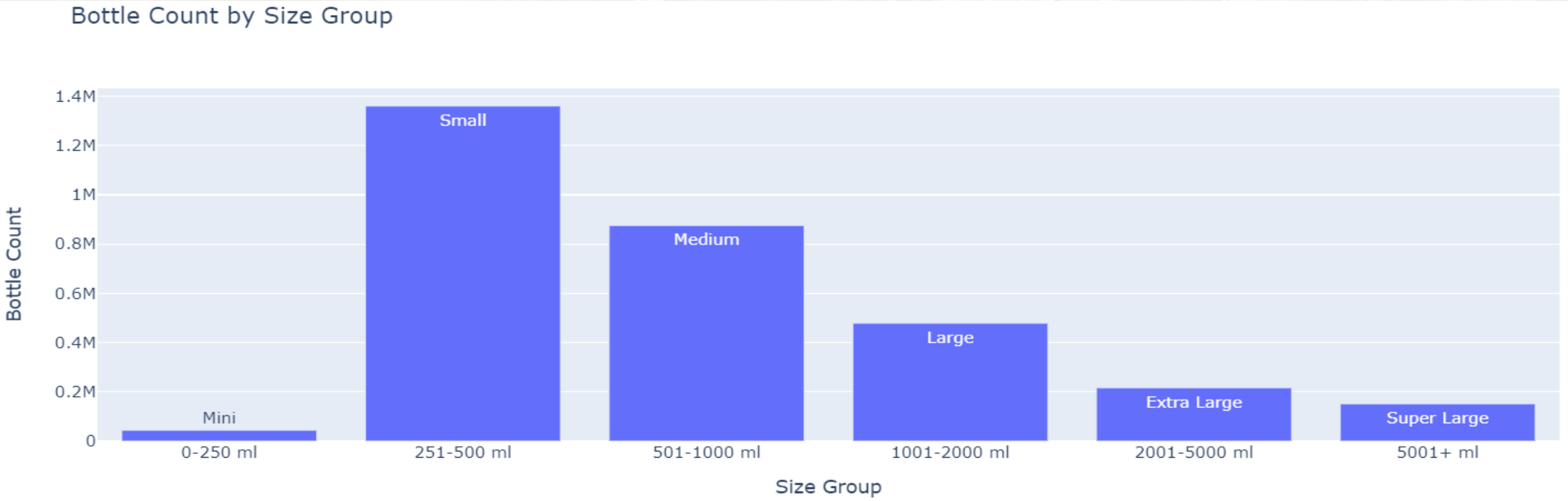
4.4 Top Manufacturers by Plastic Bottle Weight

Coca-Cola emerged as the leading manufacturer in terms of the amount of plastic bottle weight polluting the environment, accounting for 19.459 tons of plastic bottle waste. Mopani Internacional Lda ranked second with 17 tons of plastic waste, and Sociedade de Águas de Moçambique ranked third with 16.9 tons of plastic waste.



4.5 Distribution of Plastic Bottles by Size

Small-sized bottles (251-500ml) dominated the dataset, with the highest number of bottles polluting the environment, totaling 1.36 million. They were followed by medium-sized bottles (501-1000ml) with 875k bottles, large-sized bottles (1001-2000ml) with 478k bottles, extra-large-sized bottles (2001-5000ml) with 215.98k bottles, and super-large-sized bottles (5001+ml) with 151.24k bottles. Mini-sized bottles (0-250ml) had the lowest count, with 43.7k bottles found in the environment.



5. Conclusion

In conclusion, the analysis of the dataset provides valuable insights into the global issue of plastic bottle pollution. The findings highlight the varying levels of plastic bottle pollution across different countries, the significant impact of top manufacturers, and the dominance of small-sized bottles in the environment.

The results underscore the urgent need for sustainable practices, education, and collaborative efforts to address plastic bottle pollution. Promoting responsible consumption, improving recycling infrastructure, and exploring alternative packaging solutions are vital steps towards minimizing plastic waste and preserving our environment.

This project serves as a starting point for further research and initiatives focused on reducing plastic waste and fostering a circular economy. By leveraging these insights and implementing effective measures, we can strive towards a cleaner and greener future, where plastic bottle pollution is mitigated, and the well-being of our planet is prioritized.

6. Recommendations

1. **Awareness and Education**: Countries with high numbers of plastic bottles per capita should focus on educating the public about the importance of proper disposal and recycling practices. Public awareness campaigns can play a crucial role in changing behaviors and reducing plastic waste.

2. **Waste Management Improvement**: Countries with high amounts of plastic bottle weight should invest in robust waste management systems. This includes enhancing recycling infrastructure, promoting extended producer responsibility, and implementing effective collection and sorting processes.

3. **Shift to Glass Bottles**: The top three manufacturers, Coca-Cola, Mopani Internacional Lda, and Sociedade de Águas de Moçambique, should consider a transition to glass bottles. Glass bottles have a higher potential for reuse, reducing the need for continuous production and contributing to lower carbon emissions.

4. **Size-based Replacement Strategy**: Implement a phased approach to replace plastic bottles with sustainable alternatives based on their size. Starting with small-sized bottles, followed by medium, large, extra-large, super large, and finally mini bottles, this strategy can prioritize the most prevalent bottle sizes and facilitate a smooth transition.

5**. Implement bottle deposit schemes**, where consumers are incentivized to return used bottles for recycling, reducing the amount of plastic waste in the environment.

7. Future Work

While this project provides valuable insights into the plastic bottle pollution problem based on the available dataset, there are several areas for future work and exploration:

1. ***Data Expansion***: Future work could involve obtaining more comprehensive and diverse datasets that cover a wider range of countries and regions. This would provide a more accurate understanding of the global plastic bottle pollution landscape.

2. ***Longitudinal Analysis***: Conducting a longitudinal analysis could provide a deeper understanding of trends and changes in plastic bottle pollution over time.

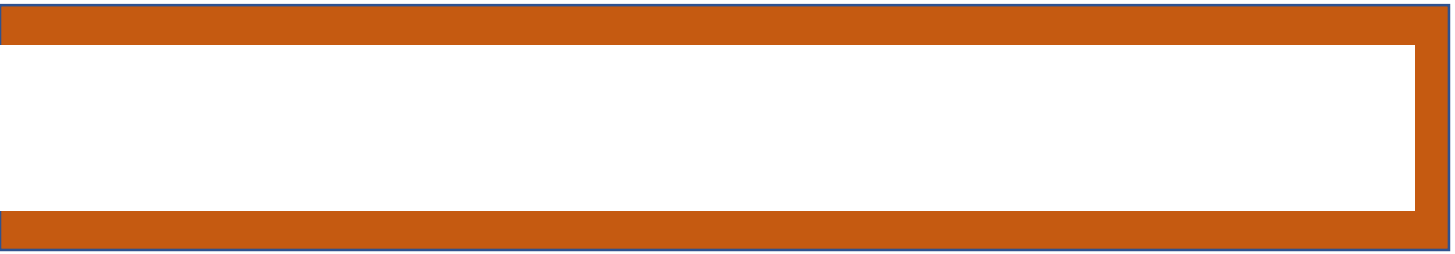
3. ***Socioeconomic Factors***: Exploring the socioeconomic factors associated with plastic bottle pollution could provide valuable insights. Future work could involve investigating the correlation between plastic bottle pollution and various socioeconomic indicators such as income levels, education, and waste management infrastructure.

4. ***Plastic Waste Management Strategies***: Further research can focus on identifying and evaluating effective plastic waste management strategies and initiatives.

5. ***Behavioral Change and Education***: Future work could involve designing and implementing educational campaigns and interventions aimed at promoting responsible consumption, waste reduction, and recycling behaviors. This would be valuable in addressing the root causes of plastic bottle pollution.

6. ***Collaboration and Partnerships***: Future work could focus on fostering partnerships and collaborations to develop and implement comprehensive solutions. This may involve engaging with manufacturers, policymakers, environmental organizations, and local communities to drive collective action.

APPENDIX



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