

A decorative graphic on the left side of the slide. It features a large green circle at the top left, a smaller green circle at the top center, and four teardrop-shaped leaves arranged in a cross-like pattern. Each leaf contains an aerial photograph of a lush green landscape with palm trees and winding paths. The leaves are arranged around a central white space.

Plastic Pollution:

Should we be
worried?



Understanding

- Plastic is given codes numbered 1-7 that correlate to where it can be recycled
- To reduce overall plastic pollution, we must take into account the different types of plastic being produced by major companies
- Reducing the plastic that is difficult to recycle is integral to reducing plastic pollution



Why Ease of recycling matters: Plastic codes

- *We cannot eliminate plastic production 100%*
- *Instead we should reduce the production of plastic that is hard to recycle*
- *Since PS,PVC,O (other), and LDPE plastic are not accepted by **standard** recycling programs, they are more likely to become plastic pollutants in the future*



Our data: Cleaning

- Missing values: The original data set was about **50%** missing values
- To proceed with our analysis, we filled null values using the mean of their respective columns

Missing Data metrics

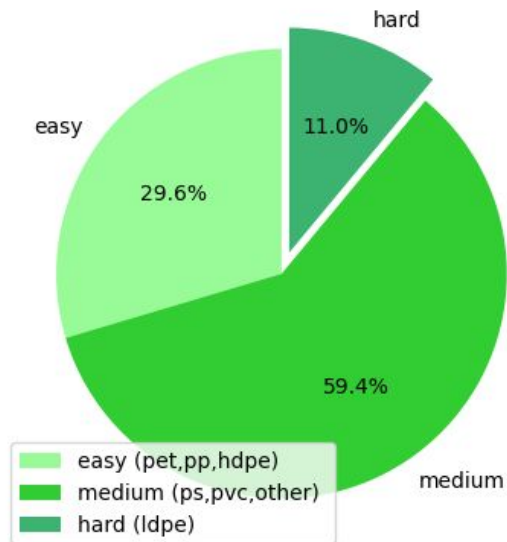
- LDPE 13.5%
- HDPE 17%
- PP 12.3%
- PS 16.2%
- PVC 35.8%

The **BIG** picture 2019

2019: Distribution of plastic produced

- Total Plastic produced: **372,276 units**
- In 2019, more than half of the plastic produced was categorized as medium
- In total, about **70%** of the plastic produced was considered moderate to difficult in terms of ease of recyclability

Percentage of total plastic in 2019 based on how easy it is to recycle

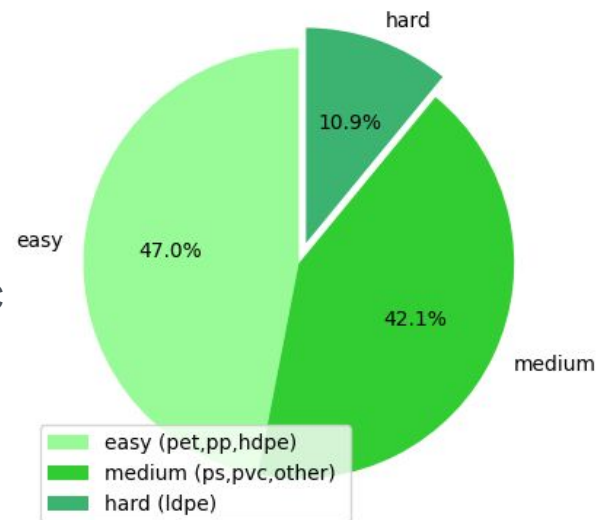


The **BIG** picture 2020

2020: Distribution of plastic produced

- Total Plastic produced: **346,334 units**
 - This is a reduction of about 7%
- In 2020, only 53% of plastic produced by major companies was considered moderate to difficult
- This is a great improvement compared to 2019

Percentage of total plastic in 2020 based on how easy it is to recycle



2019 vs 2020: Comparison

2019:

- ↪ **Mean:**
7,299
- ↪ **Total:**
372,276

2020

- ↪ **Mean:**
6,315
- ↪ **Total:**
347,334





Takeaways so far...



While the numbers and visualizations seem to show an improvement from 2019 to 2020, we should not conclude there has been an improvement without further analysis

- To get a more conclusive answer, we will investigate this relationship further with a hypothesis test
- $\alpha = 0.05$ for all tests

Our Question: Is there a difference between the total plastic produced in 2019 and 2020



- Null hypothesis: There is no difference between the total plastic produced in 2019 and 2020
- **Resulting p-value: 0.1229**
- We cannot reject our null, thus there is not a significant difference between plastic production in 2019 and 2020



What this means for us?

Have we solved the plastic problem?

- No. We are missing the bigger picture
- Although our overall plastic production has shrunk overall, we have not reduced it by a significant margin

We are doing better, but it is not enough!

Investigating our max
plastic producer:

Taiwan

Parent Company	Total Plastic
Unbranded	120632
Imperial_Brands	14
British_American_Tobacco	0
Gentle	0
Golden_Bridge	0
L&D	0
LM	0
Mevius	0
Philip_Morris	0
Reynolds_American,_Inc.	0

Key Takeaway:

- The main plastic producer is under unbranded companies while the remaining companies have little to no plastic produced



Branded vs. Unbranded: Taiwan

Close to 100% of this plastic was produced by unbranded companies

Plastic output of Taiwan in 2019

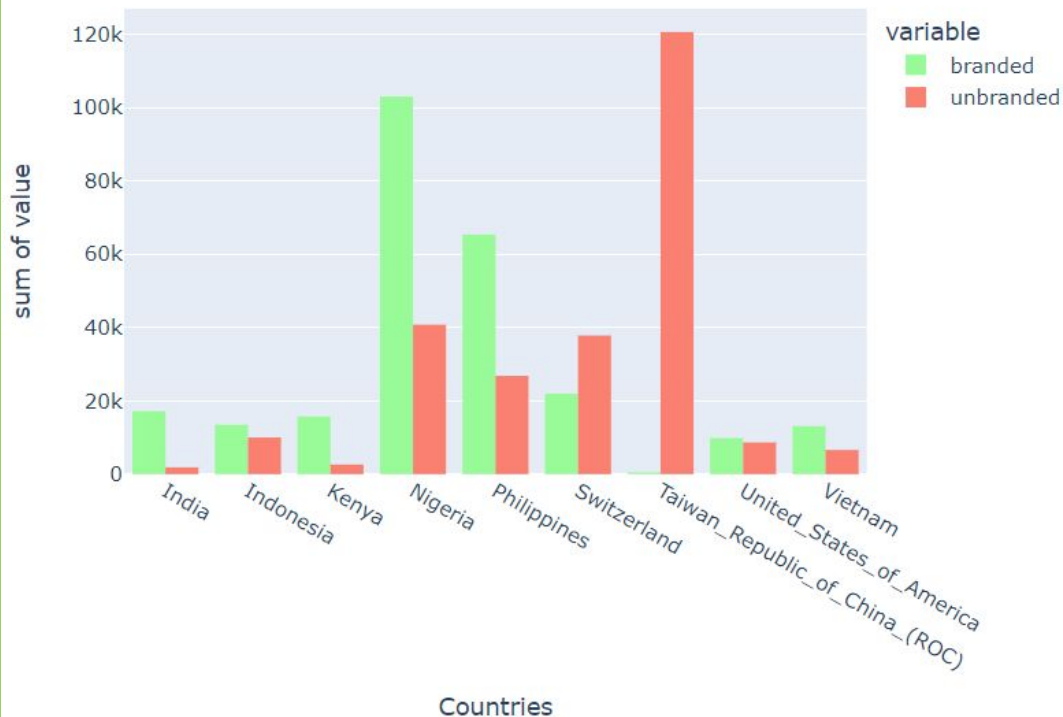




Branded vs. Unbranded: Global Scale

We will continue to investigate the relationship between unbranded companies and higher plastic production **globally**

Plastic output 2019-2020 (over 15,000 units of plastic)



Across the board: Looking at the countries that produced over 15,000 units of plastic

- In **Switzerland** and **Taiwan** a majority of plastic produced is by unbranded companies



Investigating branded vs unbranded

In order to investigate this relationship further, we will now perform a hypothesis test with $\alpha = 0.05$ to show significance





Null Hypothesis:

Unbranded companies will produce plastic less than or equal to that produced by branded companies

P-value:

$3.43e-182$ (close to 0)

Conclusion:

Since our p-value is so small, we can reject the null hypothesis, since there is evidence that unbranded companies produce more plastic than branded companies.





95% Confidence Intervals

Estimating the population mean
for total plastic production in the
two populations

Unbranded:
959.84, 7006.56

Branded:
24.85, 39.86

Strength of our analysis

STRENGTHS

Our analysis provided more some more support for our initial belief that unbranded companies tend to produce more plastic

SW

WEAKNESSES

We were unable to verify assumptions of normality and equal variance since so much of our data was substituted with the mean
Thus we cannot be certain statistical findings are significant



Do we have a plastic problem on the global scale?


- No, but we are not making any progress in reducing our plastic overall.
- To understand these metrics on a global scale, we will be looking at tableau



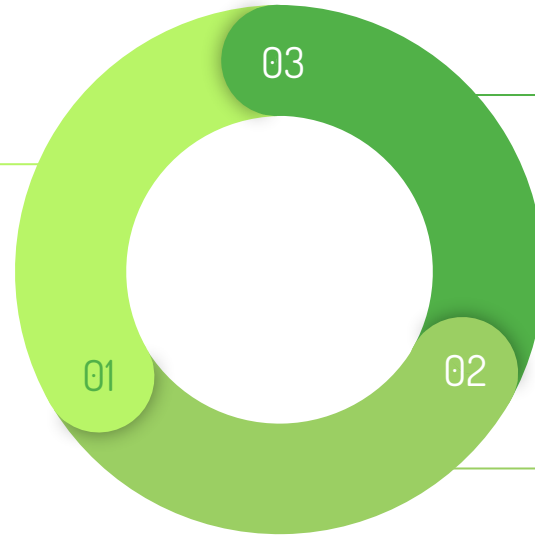


For the Future...

Our plan for plastic reduction



Requiring companies to report their numbers yearly



Preventing brands from reporting numbers as unbranded to force accountability

Providing better education about different types of plastic, why recycling matters



Any questions?