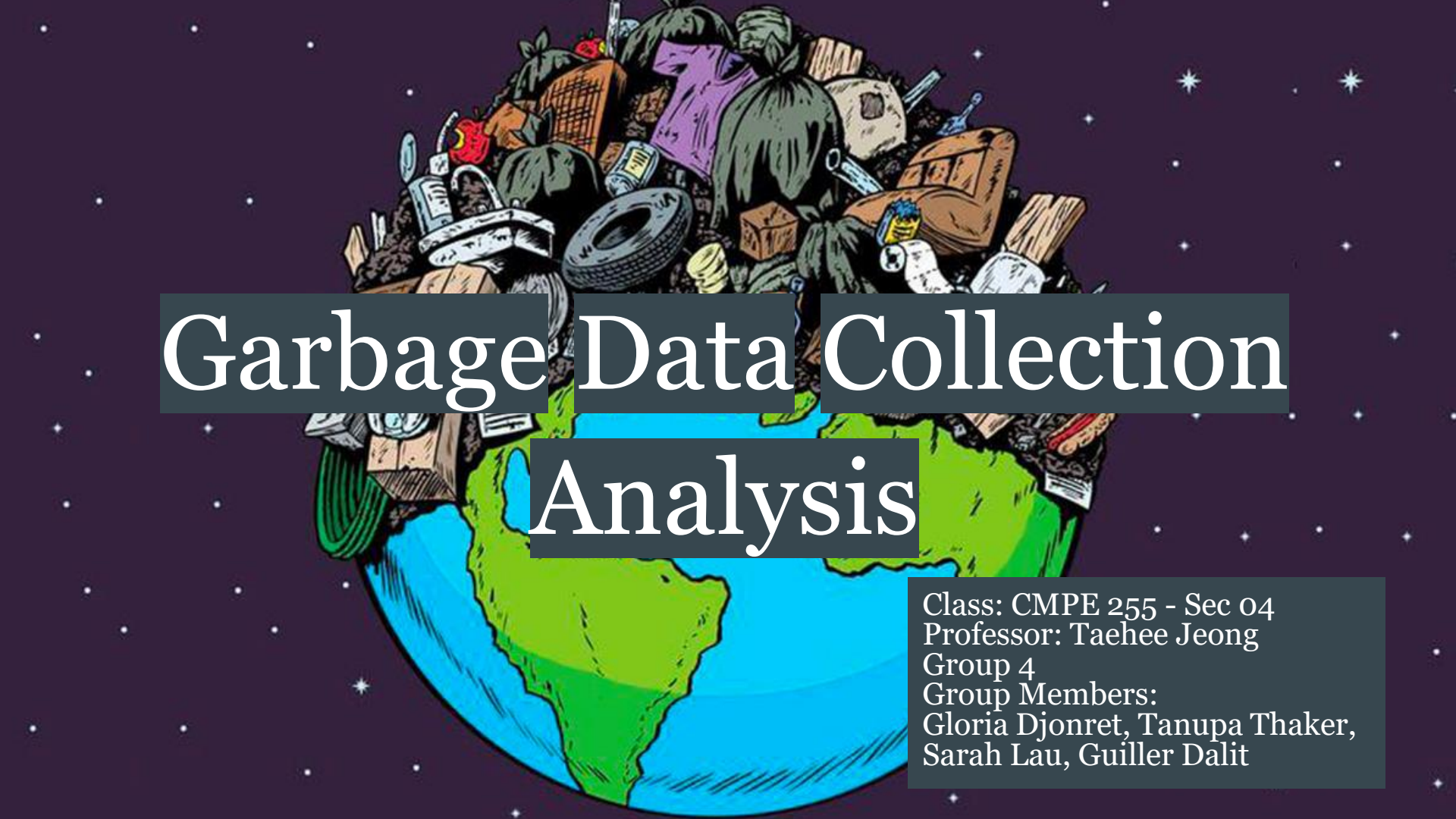

Garbage Data Collection Analysis

Class: CMPE 255 - Sec 04
Professor: Taehee Jeong
Group 4
Group Members:
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Introduction

- Our team explored how 214 countries handle their trash — from sorting bins to waste disposal."
- "Today, we're sharing what we found, highlighting why accurate info on this topic matters for all of us."
- "The goal is to understand how different countries tackle their waste challenges and learn from each other."
- "This isn't just about numbers; it's about finding practical solutions to keep our planet cleaner and healthier."
- We want to bring awareness of the importance of proper waste managements

Types of Waste

Municipal Solid Waste (MSW):Everyday household waste generated from homes, schools, and businesses. Examples: paper, plastic, glass, metal, textiles, and other common items.

Biodegradable Waste: Organic waste that can be decomposed by microorganisms. Examples: Food waste, yard waste, and other organic materials.

Other wastes: Green Waste(Organic waste from gardens, parks) , Toxic Waste(Pesticides, certain cleaning agents, and industrial chemicals), E-Waste (Computers, smartphones, televisions), Bulk or Bulky Waste(Large items that do not fit into standard garbage bins such as Furniture, appliances, mattresses)

Consequence of Garbage Waste

- Environmental Pollution: Air Pollution, Water Pollution, Soil Pollution

Type of Disease cause by garbage waste: “Cholera “

Cholera is an infectious disease caused by the bacterium Vibrio cholerae. It typically spread through contaminated water and food, and it is more common in areas with inadequate sanitation and poor access to clean water.

Factors of Cholera

- Contaminated Water Sources
- Poor Sanitation
- Overcrowded and Unsanitary Living Condition
- Global Travel and Migration: Travelers to cholera-affected regions may contribute to the global spread of the disease.

Other disease/ Health Risks:

Open dumping and burning of waste can release toxins and carcinogens that can cause. Respiratory problems, skin diseases, and other health issues may result from exposure to such pollutants.

Example 1: Cholera Outbreak in Haiti (2010)

In October 2010, a cholera outbreak occurred in Haiti

Contributing Factors: Contaminated Water Sources, Poor Waste Management

Consequences:

The cholera outbreak in Haiti was severe, resulting in tens of thousands of reported cases and thousands of deaths.

The lack of infrastructure & waste management, contributed to the rapid transmission of the disease in a population already grappling with the aftermath of a natural disaster.

Example 2: Love Canal Disaster(Niagara Falls, New York)

In the 1940s and 1950s, a chemical company used the Love Canal site as a dump for toxic waste, burying drums containing chemicals such as dioxin, benzene, and various other hazardous substances.

<u>Consequences</u>:

Contamination of Soil and Water

Health Issues: Residents began to experience health problems, including higher rates of birth defects, miscarriages, and other health issues.

Environmental Impact: The contamination led to dead vegetation, foul odors, and a noticeable deterioration of the physical environment.

Case Study 1: Curitiba, Brazil - Successful Waste Management

Approach: Implemented an innovative and successful waste management system.

Key Features of the program:

- Implemented a program where residents could exchange recyclable materials for fresh produce.
- Residents are required to sort their waste into different categories at home.

Results:

- The program led to a notable decrease in the amount of waste sent to landfills.
- Increased community involvement and awareness of waste management practices.
- The optimized collection system resulted in cost savings for the city.

Case Study 2: Rwanda - Transformative Waste Management Policies

Objective: Implementation of innovative waste management policies to address environmental challenges.

Plastic Bag Ban:

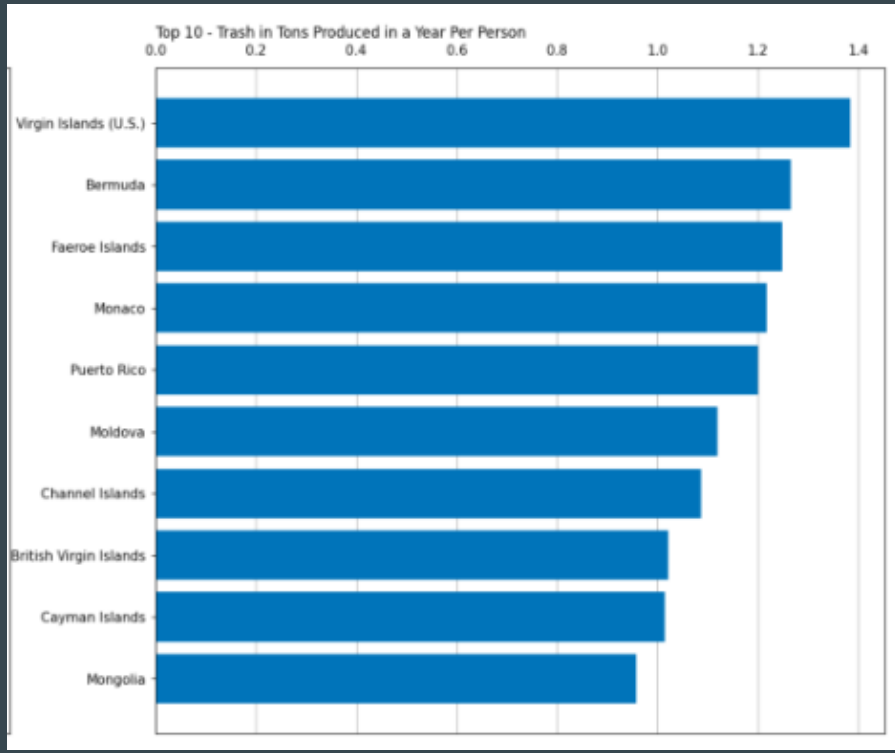
In 2008, Rwanda became one of the first countries globally to implement a complete ban on plastic bags. If you are ever caught with a plastic bag, you could go to jail and you will have to pay a fine.

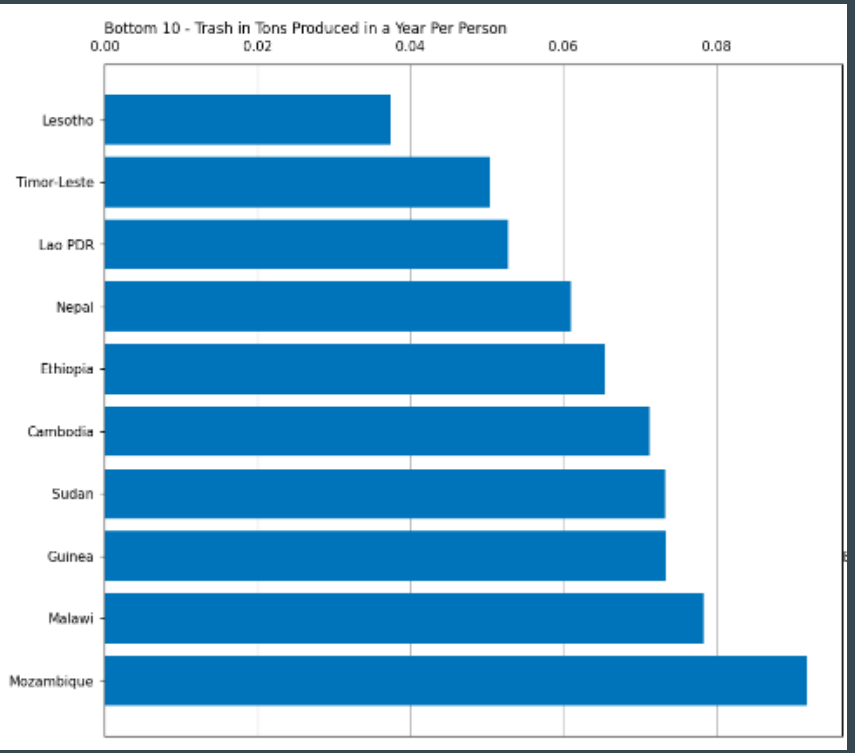
Results
The plastic bag ban has led to a noticeable reduction in plastic pollution, contributing to a cleaner environment.

Kigali, The capital of Rwanda, has gained a reputation for being one of the cleanest cities in Africa due to various initiatives to promote cleanliness

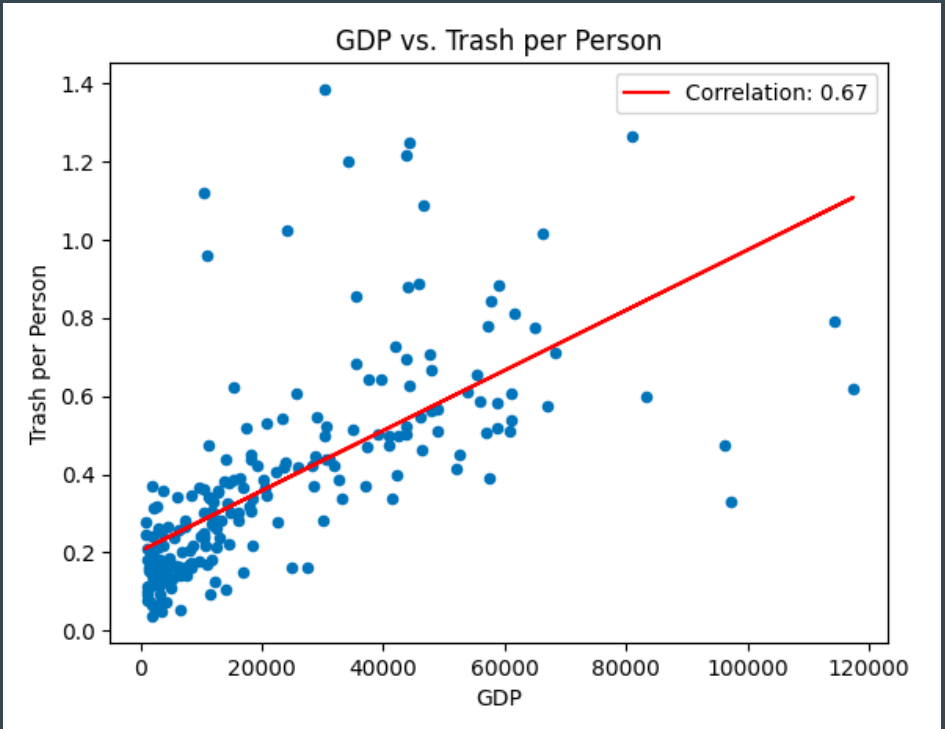
Analysis

Top 10 & Bottom 10 Countries of Trash in Tons Produced in a Year Per Person



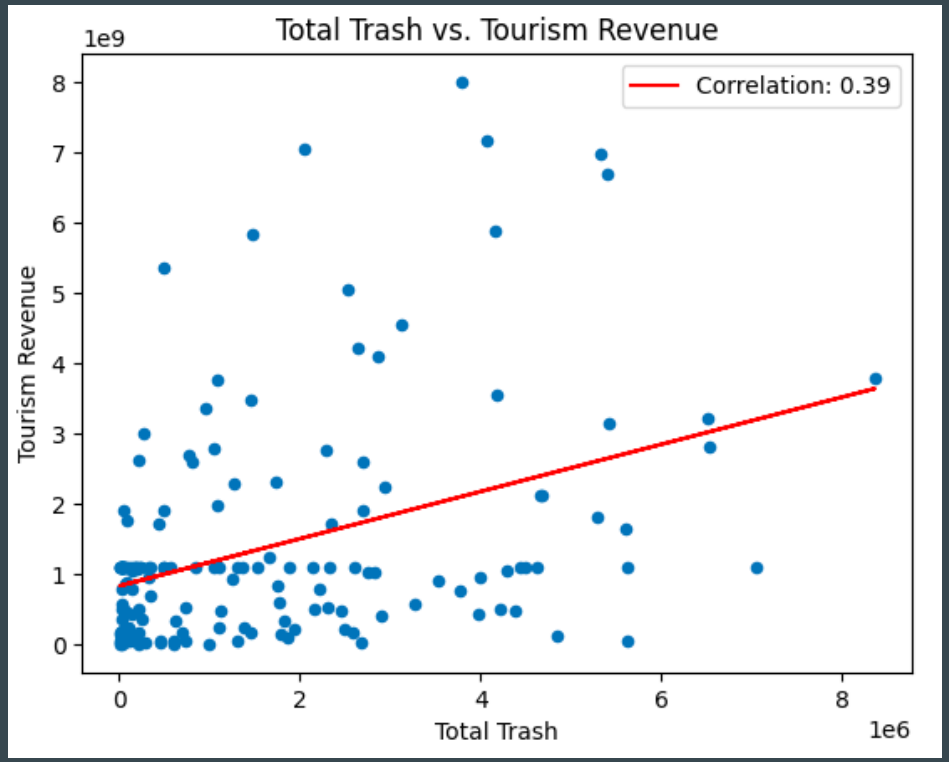


Country's GDP vs. Trash Generated per Person



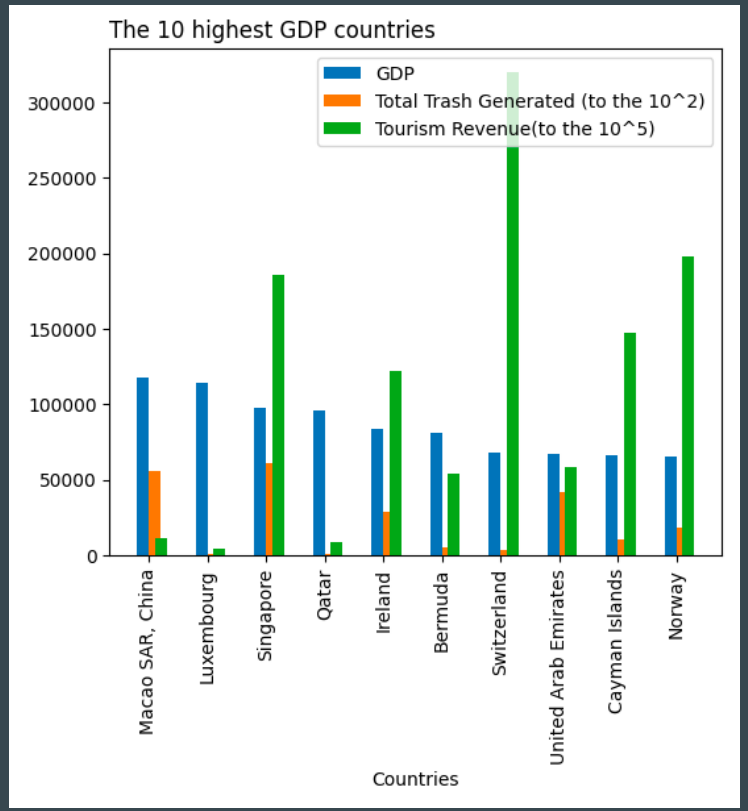
- Averagely, higher GDP means more trash generated per person

Country's Total Trash Generated vs. Tourism Revenue



- Averagely, more tourism means more trash generated
  - Littering
  - Beach waste
  - Biowaste (food waste and byproducts increase)
  - Transportation waste

10 Highest GDP Countries

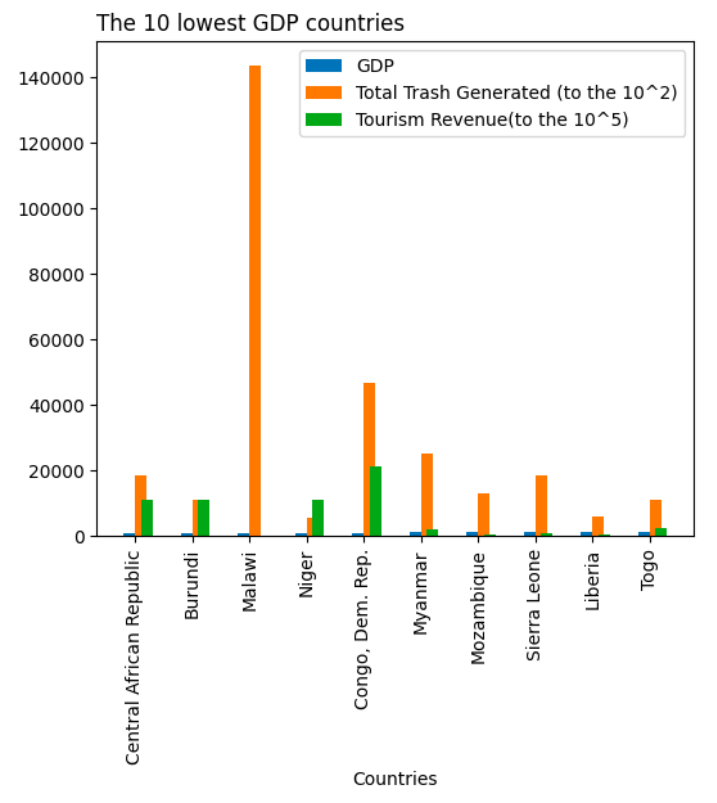


- Exception 1: Very high GDP means more money for more efficient waste management
  - Trash generated is less than GDP
- Depending on the type of tourism and policies, more trash is generated
  - Switzerland: Required to recycle
  - Macao, Singapore, and Ireland tourism are focused on materialism

Investment in Waste Infrastructure

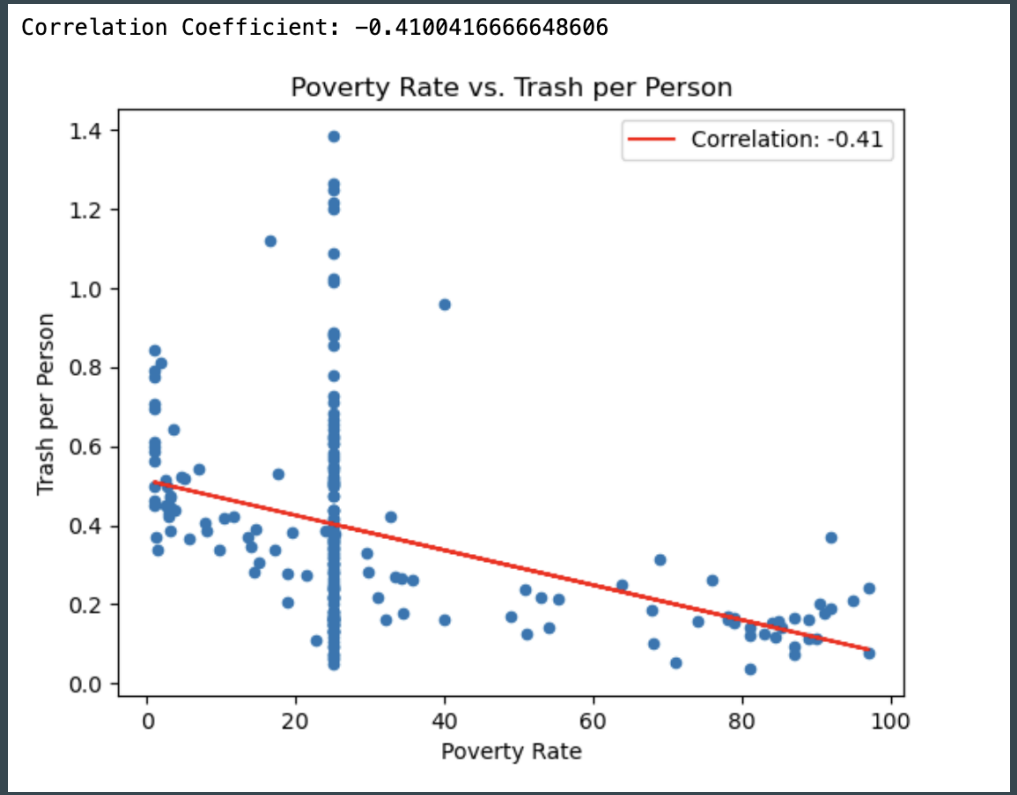
- Commitment to Sustainability:
  - Countries that prioritize environmental sustainability may allocate a higher percentage of their GDP to waste infrastructure.
  - This can include investments in recycling facilities, waste-to-energy projects, and public awareness campaigns.

10 Lowest GDP Countries



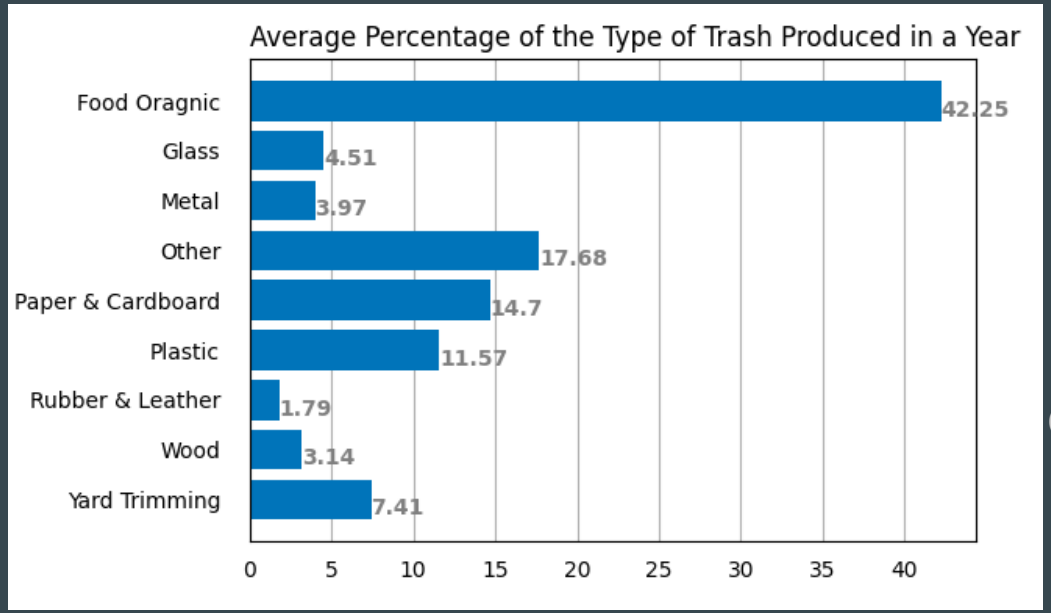
- Exception 2: Very low GDP means less money for waste infrastructure
  - Trash generated exceeds GDP
- Outlier: Malawi
  - Plagued with lots of issues:
    - Poverty
    - Declining resources
    - Deforestation
    - Unpredictable weather

Country's Poverty Statistics vs. Total Trash Generated



- Lack of infrastructure:
  - Insufficient infrastructure for proper storage, transportation, and distribution of food. This can lead to higher levels of food spoilage and waste.
- Limited access to technology:
  - lack access to modern farming techniques and technologies that could help reduce post-harvest losses.

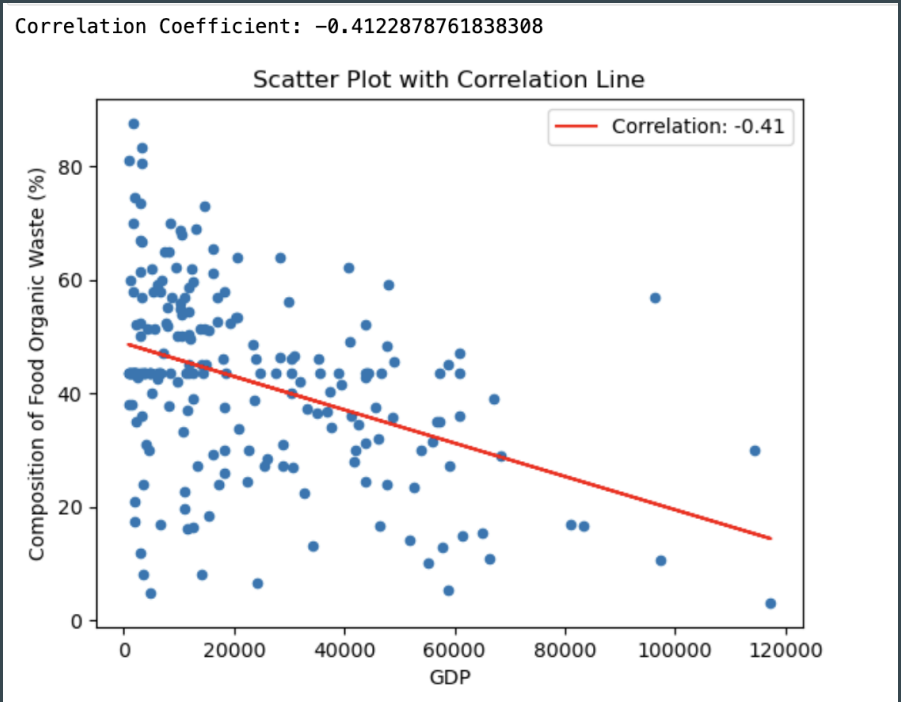
Average Percentage of the Type of Trash Produced in a Year



- Food organic waste by average encompasses 42.25% of the waste generated by a country

Correlations in the next few slides

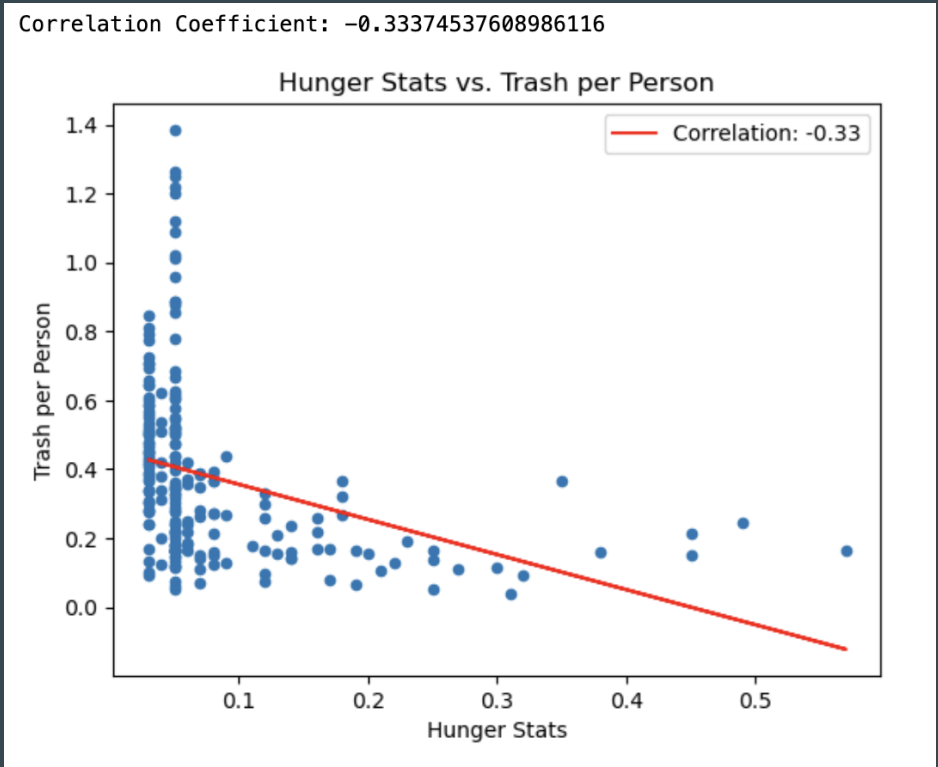
Country's GDP vs. Food Organic Waste



Lower GDP means higher food waste

- More money to create more efficient use of resources
- Hence, When a significant amount of food is wasted, it means resources such as labor, water, energy, and land used in the production of that food are also wasted.
    - This inefficient use of resources can lead to lower productivity and economic output, negatively affecting GDP.

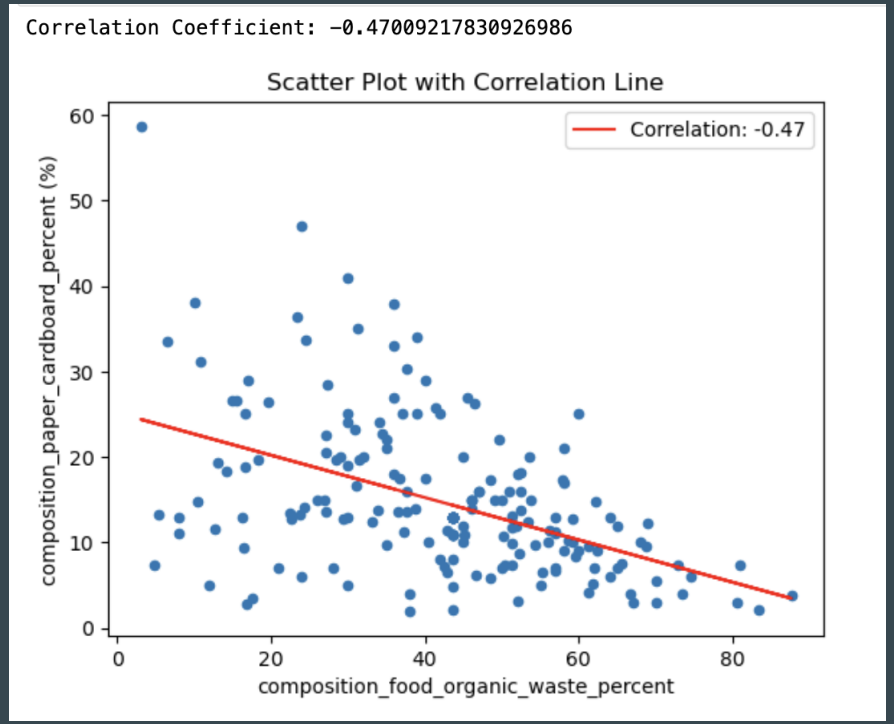
Country's Hunger Statistics vs. Total Trash Generated



The higher the trash per person, the lower the hunger statistics

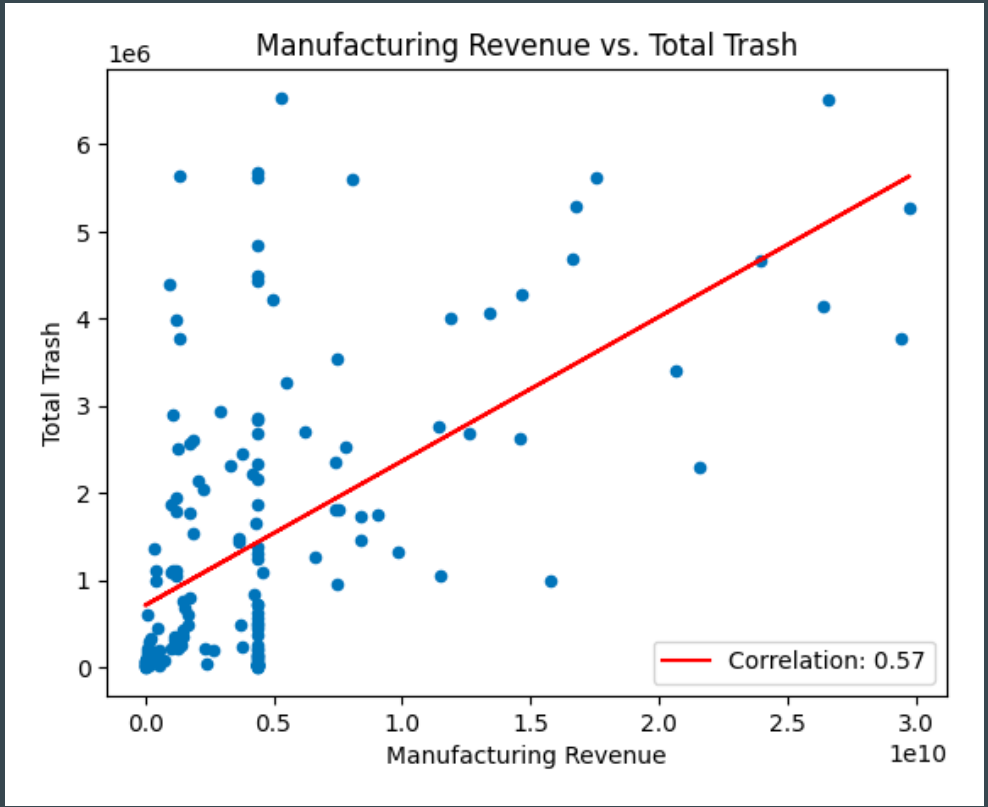
- Inefficient Distribution Systems:
  - The better the transport system of food the higher the trash per person.
  - Hence, inefficiency in the supply chain can contribute to both hunger and food waste.
- Limited Access to Storage and Preservation:
  - With no means of preservation, foods have to be eaten or it will go to waste.
  - On the other hand, perishable food items that needs to be transported are more likely to spoil before reaching those in need. Thus, become waste.

Country's Food Organic Waste vs. Paper & Cardboard Waste



- Higher paper and cardboard waste means less food organic waste
  - Organic waste is used to make paper/Cardboard
    - Countries with a focus on organic food may use packaging materials that are more biodegradable, resulting in less paper and cardboard waste.
  - Conversely, regions with a high reliance on processed and packaged foods may generate more plastic waste.

Country's Manufacturing Revenue vs. Total Trash Generated



The higher the Manufacturing Revenue means the higher the total trash generated

- Countries with a significant industrial presence may generate more waste due to manufacturing processes.

Additional Points

- Preservation
- Recycling
- Knowledge of Recycling
- Use of reusable containers
- Composting
- Composting at home

What is the uniqueness of your project" compared to related works?

1. We integrate multiple dimensions into a cohesive analysis. It examines the interconnectedness of recycling technologies, economic factors, poverty, and societal influences on waste generation.
2. The project goes beyond traditional waste management analysis by addressing socioeconomic factors like poverty and hunger.
3. Explores correlations between GDP, population, and waste generation using a measure of central tendency.

4. utilizes feature engineering methods to extract meaningful insights, like the correlation between organic waste and paper/cardboard waste.

5. We creatively employs data reduction techniques to identify specific challenges in impoverished areas, such as lack of infrastructure, limited access to technology, and reduced purchasing power.

Current Technologies/Innovations to Help With Overall Waste Management

Advanced Recycling Technologies

Chemical Recycling: Convert plastic waste into basic chemical components for new materials.

Biodegradable Plastics: Plastics designed to break down, reducing environmental impact.

Sustainable Packaging Solutions

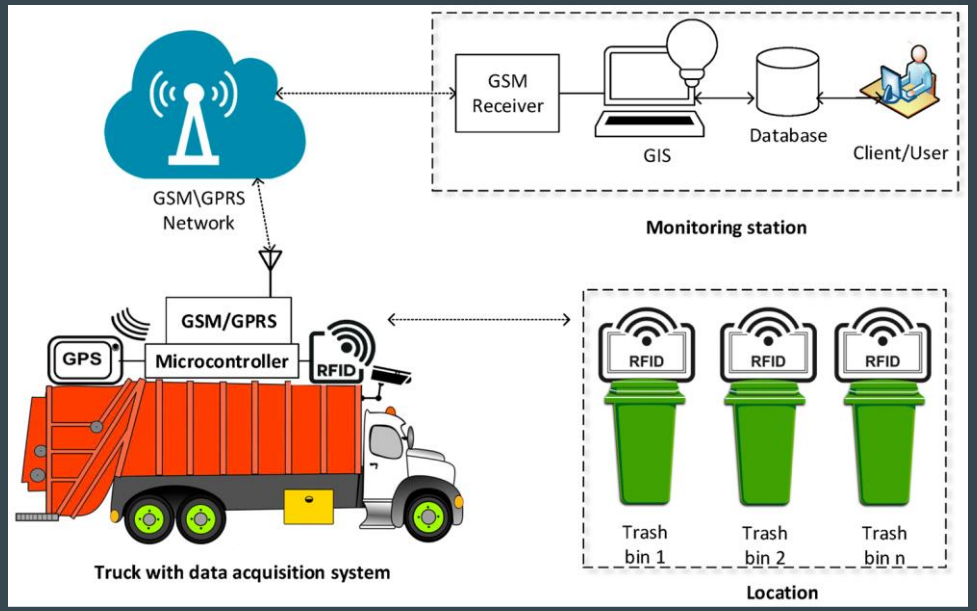
Biodegradable Packaging: Packaging materials that can break down naturally.

Minimalist Packaging: Reducing unnecessary packaging to minimize waste.

Smart Waste Management Systems

Sensor-Based Waste Bins: Bins equipped with sensors to optimize waste collection schedules.

RFID (Radio-Frequency Identification) Technology: Enables better tracking and management of waste throughout its lifecycle.



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